ADHS im Klassenzimmer

Die Einstellung von Lehrkräften zu Schülerinnen und Schülern mit einer Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung sowie zu entsprechenden Classroom-Management-Strategien

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Bildung ist die mächtigste Waffe,

die du verwenden kannst,

um die Welt zu verändern

(Nelson Mandela)

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Abkürzungen

ADHS	Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung
CMS	Classroom-Management-Strategien
DSM-5	Diagnostic and Statistical Manual of Mental Disorders
ICD-10	Internationale statistische Klassifikation der Krankheiten und verwandter Gesundheitsprobleme *(engl.: International Statistical Classification of Diseases and Related Health Problems)*
RWA	Rechtsgerichteter Autoritarismus *(engl. right-wing-authoritarianism)*
SDO	Soziale Dominanzorientierung
TPB	Theorie des geplanten Verhaltens *(engl. Theory of planned behavior)*
ZNS	Zentrales Nervensystem

Zusammenfassung und Abstract

Zusammenfassung

Mit ein bis zwei betroffenen Schülerinnen bzw. Schülern pro Klasse zählt die Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS) zu den häufigsten psychischen Störungen im Kindes- und Jugendalter. Die Kernsymptome Unaufmerksamkeit, Hyperaktivität und Impulsivität führen dazu, dass betroffene Schülerinnen und Schülern den Anforderungen in der Schule nicht gerecht werden können. Gleichzeitig stellen die Symptome Herausforderungen für Lehrkräfte dar. Nichtsdestotrotz werden evidenzbasierte Classroom-Management-Strategien (CMS) zur Reduktion ADHS bedingter Verhaltensauffälligkeiten im schulischen Alltag kaum genutzt. Die vorliegende Dissertation stellt fünf Studien vor, die sich mit Gründen für die beschriebene Implementationslücke beschäftigen und die Relevanz von Einstellung in diesem Kontext beleuchten.

Die **erste Studie** analysierte die Basis sowie den Austausch des aktuellen Wissens der Forschungsfelder Psychologie/Psychiatrie und Pädagogik bzgl. CMS für Schülerinnen und Schüler mit ADHS. Mittels bibliometrischer Methoden wurde deutlich, dass der Großteil der Literatur dem Forschungsfeld Psychologie/Psychiatrie zuzuordnen war, das die Perspektive der Lehrkräfte und ihren Umgang mit herausfordernden Verhalten jedoch nur begrenzt betrachtete. Auch zeigte sich, dass Implementationsmethoden und –barrieren bisher kaum erforscht wurden.

Die **zweite Studie** stellte den im Rahmen dieser Promotion entwickelten *ADHS-Schul-Erwartungsfragebogen* (*ASE*) zur Erfassung von Wissen über ADHS, Einstellung zu Schülerinnen und Schülern mit ADHS sowie zu Einstellung zu und Einsatz von CMS vor und validierte diesen.

Mit Hilfe des *ASE* wurden in der **dritten Studie** Lehrkräfte und Psychotherapeut*innen in Ausbildung hinsichtlich ihrer Einstellung zu Kindern mit ADHS verglichen. Des Weiteren wurden drei latente Profile dieser Einstellung identifiziert und

analysiert. Die den unterschiedlichen Profilen zugeordneten Fachkräfte unterschieden sich insbesondere in der Bewertung der von betroffenen Kindern erwarteten Verhaltensweisen und Eigenschaften. Neben ihrer Einstellung zu diesen Kindern unterschieden sie sich u.a. auch in der Effektivitätsbeurteilung von CMS. Damit verdeutlichte diese Studie, dass bei der Implementation von CMS unterschiedliche Grundhaltungen der Fachkräfte beachtet werden müssen.

Die **vierte Studie** untersuchte mittels Pfadmodellanalysen Einflüsse auf die Einstellung zu CMS und auf die Intention, diese einzusetzen, anhand einer Stichprobe von Lehramtsstudierenden. In der **fünften Studie** wurden die vorangegangenen Pfadmodelle erweitert und anhand einer Stichprobe von Lehrkräften analysiert. Beide Studien zeigten, dass die Einstellung zu CMS maßgeblich für die Intention, diese einzusetzen, ist. Zur Förderung des Einsatzes effektiver CMS stellten die Einstellung zu Schülerinnen und Schülern mit ADHS, Wissen über die Störung und den Umgang damit, wahrgenommene Kontrolle sowie Stress relevante Variablen dar.

Zusammenfassend veranschaulicht die vorliegende Dissertation, dass die Einstellung zu Schülerinnen und Schülern mit ADHS sowie zu CMS eine bedeutsame Rolle bei der Implementation effektiver CMS spielen. Außerdem wird deutlich, dass eine entsprechende Ausbildung und Schulung von Lehrkräften relevant ist, um Schülerinnen und Schüler mit ADHS adäquat zu unterstützen und damit gleichzeitig die Lernumgebung im Klassenzimmer zu verbessern und die Belastung gering zu halten.

Abstract

With an average of one or two affected pupils per classroom, Attention-Deficit/Hyperactivity Disorder (ADHD) is one of the most common mental disorders in childhood and adolescence. Due to the core symptoms of inattention, hyperactivity and impulsivity, affected pupils cannot meet the requirements at school. At the same time these symptoms represent challenging

behavior for teachers. Nevertheless, evidence-based classroom management strategies (CMS) to reduce ADHD-related behavioral problems are rarely used in everyday school life. The current dissertation presents five studies that deal with reasons for the described science-practitioner-gap and illustrate die relevance of attitude in this context.

The **first study** analyzed the basis as well as the exchange of the current knowledge of the scientific fields psychology/psychiatry and education regarding CMS for pupils with ADHD. Bibliometric methods revealed that most of the literature was assigned to the scientific field of psychology/psychiatry that only restrictedly considered the perspective of teachers and their handling of challenging behavior. Additionally, implementation methods and barriers showed to be rarely investigated so far.

The **second study** introduced and validated the *ADHD-school-expectation questionnaire* (*ASE*) which was developed in this graduation project to assess knowledge about ADHD, attitude towards pupils with ADHD and attitude towards and use of CMS.

By using the ASE, in **the third study** teachers' and psychotherapists in training's attitude towards children with ADHD was compared. Furthermore, three latent profiles regarding this attitude were identified and analyzed. Professionals assigned to the different profiles differed mainly in their rating of expected behavioral patterns and characteristics of children with ADHD. Next to their attitude towards these children they also differed amongst others in their effectiveness rating of CMS. Thereby, this study highlighted that different tenors of professionals need to be considered when implementing CMS.

The **fourth study** used path model analysis to investigate influences on the attitude towards CMS and on the intention to use these with a sample of pre-service teachers. In the **fifth study** the previous path models were extended and analyzed with a sample of in-service teachers. Both studies showed that the attitude towards CMS is critical for the intention to use these. To enhance the use of effective CMS attitude towards pupils with ADHD, knowledge

about the disorder and handling of it, perceived control and stress presented themselves to be relevant variables.

Summing up, the current dissertation points out that the attitude towards pupils with ADHD and towards CMS play important roles when implementing effective CMS. Moreover, it becomes clear that an applicable education for teachers is relevant, to support pupils with ADHD appropriately and to simultaneously improve the learning environment in the classroom and keep the strain on a low level.

1 Theoretischer Hintergrund

„*Er gaukelt und schaukelt, er rappelt und zappelt auf dem Stuhle hin und her. ‚Philipp, das missfällt mir sehr!*‘ “ (Hoffmann, 1845, S.22). Wenngleich Heinrich Hofmanns Erzählung vom Zappel-Philipp auch noch so alt ist, so ist die geschilderte Situation auch heute noch für ein bis zwei Schülerinnen bzw. Schüler pro Klasse Alltag (Polanczyk, Silva de Lima, Horta, Biederman, & Rohde, 2007; Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014). Sie leiden unter einer Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung (ADHS) mit den Kernsymptomen Unaufmerksamkeit, Hyperaktivität und Impulsivität. Diese führen im Unterricht dazu, dass die betroffenen Schülerinnen und Schüler beispielsweise nicht zuhören oder auf dem Stuhl herumrutschen (Campbell, Halperin, & Sonuga-Barke, 2015). Die beschriebenen Verhaltensweisen wiederum begünstigen Stress auf Seiten der Lehrkräfte und führen zum Einsatz korrektiver Strategien wie z.B. Ermahnungen (Greene, Beszterczey, Katzenstein, Park, & Goring, 2016; Ruhmland & Christiansen, 2017). Evidenzbasierte Classroom-Management-Strategien (CMS), die die ADHS bezogene Symptomatik reduzieren können, werden hingegen bisher kaum im schulischen Alltag implementiert (Ruhmland & Christiansen, 2017).

Die vorliegende Dissertation beschäftigt sich mit möglichen Gründen für diese Implementationslücke und betrachtet dabei insbesondere den Faktor der Einstellung von Lehrkräften zu Schülerinnen und Schülern mit ADHS sowie zu entsprechenden CMS genauer.

Im Folgenden wird hierfür zunächst das Störungsbild der ADHS detaillierter dargestellt. Anschließend werden die Auswirkungen der Störung auf den schulischen Bereich und die schulischen Interventionsmöglichkeiten betrachtet. Außerdem wird die Relevanz von Einstellung im Kontext der beschriebenen Implementationslücke beleuchtet.

1.1 Aufmerksamkeitsdefizit/Hyperaktivitätsstörung

Der folgende Abschnitt beschreibt zunächst die Symptome einer ADHS und geht anschießend auf die epidemiologischen und ätiologischen Hintergründe der Störung ein.

1.1.1 Symptome

Eine ADHS ist, den aktuellen Diagnosesystemen *Internationale statistische Klassifikation der Krankheiten und verwandter Gesundheitsprobleme* (ICD-10; World Health Organization, 2011) und *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) zufolge, gekennzeichnet durch die Kernsymptome Unaufmerksamkeit, Hyperaktivität und Impulsivität. Nach ICD-10 müssen zur Erfüllung der Diagnose der *einfachen Aktivitäts- und Aufmerksamkeitsstörung – F90.0* mindestens sechs der Kriterien zur Unaufmerksamkeit (Sorgfaltsfehler; Schwierigkeiten bei der Aufrechterhaltung von Aufmerksamkeit; nicht hören; nicht folgen können; beeinträchtigte Aufgabenorganisation; Vermeidung aufmerksamkeitsfordernder Aufgaben; Verlust von Aufgabenmaterial; schnelle Ablenkbarkeit; Vergesslichkeit) erfüllt sein. Weiterhin müssen nach ICD-10 mindestens drei der hyperaktiven Kriterien (Fuchteln mit Händen und Füßen oder Herumrutschen auf dem Stuhl; Verlassen des Platzes; häufiges Umherlaufen / Klettern auf Möbel; unnötig laute / exzessive motorische Aktivität) sowie mindestens ein impulsives Kriterium (mit Antworten herausplatzen; nicht abwarten können; Unterbrechung anderer; exzessives Reden) zutreffen. Bei zusätzlicher Erfüllung der Kriterien für eine Störung des Sozialverhaltens ist nach ICD-10 die Diagnose für eine *hyperkinetische Störung des Sozialverhaltens – F90.1* zu vergeben. Zudem ermöglicht das ICD-10 die Vergabe der Diagnose der *sonstigen näher bezeichneten Verhaltens- und emotionalen Störungen mit Beginn in der Kindheit und Jugend – F98.8* für eine Aufmerksamkeitsstörung ohne Hyperaktivität. Die Symptome einer ADHS müssen mindestens sechs Monate in mindestens zwei Lebensbereichen (z.B. zuhause und in der Schule) auftreten, deutlich von

alterstypischem Verhalten abweichen und zu einem deutlichen Leiden bzw. einer Beeinträchtigung des schulischen, beruflichen oder sozialen Funktionsniveaus führen. Der Beginn der Störung muss nach ICD-10 vor dem siebten Lebensjahr liegen. Das DSM-5 sieht einen Beginn vor dem zwölften Lebensjahr vor. Zudem unterscheidet das DSM-5 zwischen den drei Subtypen *vorwiegend unaufmerksam*, *vorwiegend hyperaktiv-impulsiv* und *kombiniert unaufmerksam und hyperaktiv-impulsiv*.

1.1.2 Epidemiologie

Statistisch gesehen sind nach Metaanalysen von Polanczyk et al. (2007, 2014), die 135 Studien mit über 170.000 Studienteilnehmern im Zeitraum von 1985 bis 2012 untersuchten, weltweit etwa 5 % aller Kinder und Jugendlichen von einer ADHS betroffen. Die Angaben einzelner Studien schwanken in Abhängigkeit der zugrunde gelegten Diagnosesysteme, Messmethoden und Stichprobeneigenschaften stark. Ein Anstieg der Prävalenzrate konnte, anders als in den Medien häufig dargestellt (z.B. Bohsem, 2016), laut den Autor*innen bei Anwendung standardisierter Diagnostik in den letzten drei Jahrzenten nicht verzeichnet werden.

Die Studie zur Gesundheit von Kindern und Jugendlichen in Deutschland (KiGGS; Göbel, Baumgarten, Kuntz, Hölling, & Schlack, 2018) ermittelte, dass 4.4 % der Eltern von insgesamt 13270 Kindern und Jugendlichen im Alter von drei bis 17 Jahren im Befragungszeitraum von 2014 – 2017 angaben, dass bei ihrem Kind jemals eine ADHS durch eine/n Ärzt*in oder eine/n Psycholog*in diagnostiziert wurde. Jungen erhielten die Diagnose dabei doppelt so häufig wie Mädchen (6.5 % vs. 2.3 %), wenngleich bei ihnen die Punktprävalenzrate im Vergleich zum Befragungszeitraum von 2003 – 2006 um 0.9 % sank.

Ein Grund für diesen Rückgang der Punktprävalenzrate bei Jungen könnte eine Reaktion auf die Studienergebnisse von Bruchmüller, Margraf und Schneider (2012) sein. Sie beschäftigten sich mit dem unterschiedlichen männlich-weiblichen Geschlechterverhältnis

von 3:1 in Studien der allgemeinen Population (Barkley, 2006) und 5:1 bis 9:1 in klinischen Stichproben (Popow & Ohmann, 2020; Sandberg, 2009). Hierfür untersuchten sie die Diagnosevergabe von N = 473 Psycholog*innen, Psychiater*innen sowie Sozialarbeiter*innen mit einer Zulassung für Kinder- und Jugendpsychotherapie. Dabei nutzten sie vier unterschiedliche Fallvignetten jeweils in einer Form mit männlichem und in einer mit weiblichem Patientennamen. Nur in einer der vier Fallvignetten waren die ADHS-Kriterien nach ICD-10 erfüllt. In den anderen Fällen diagnostizierten 16.7 % der Befragten die Störung, obwohl die Kriterien nach ICD-10 nicht erfüllt waren. In den Fällen mit männlichem Patientennamen geschah dies etwa doppelt so häufig wie in den Fällen mit weiblichem Patientennamen. Die Autor*innen schlossen daraus, dass die Störung insbesondere bei Jungen überdiagnostiziert wird.

Für das Erwachsenenalter von 18 – 44 Jahren fanden Kessler et al. (2006) mit einer US-amerikanischen Befragung von $N = 3199$ Personen eine Punktprävalenzschätzung der ADHS von 4.4 %. Eine deutsche Studie mit $N = 1655$ Befragten im Alter von 18 – 64 Jahren fand eine vergleichbare Punktprävalenz von 4.7 % (Zwaan et al., 2012). Im Alter von über 50 Jahren konnten Dobrosavljevic, Solares, Cortese, Andershed und Larsson (2020) mit ihrer Metaanalyse auf der Basis von 20 Studien und über 20 000 000 Befragten je nach Messmethode eine Punktprävalenz von 0.09 % – 2.1 % aufzeigen.

Häufig bemerken Eltern von Kindern mit einer ADHS schon im Krabbelalter eine erhöhte motorische Aktivität, die jedoch bis zu einem Alter von vier Jahren schwer von einer altersadäquaten Entwicklung abzugrenzen ist (American Psychiatric Association, 2013; Faraone et al., 2015; Häge, Hohmann, Millenet, & Banaschewski, 2020). Erstmals diagnostiziert wird eine ADHS meist nach Eintritt der betroffenen Kinder in das Schulalter, wenn sich die Symptome beispielweise durch herumrutschen auf dem Stuhl, nicht zuhören und hineinrufen im Unterricht zeigen (Campbell et al., 2015). Wie zahlreiche Überblicksarbeiten aufzeigen konnten, kann sich die Symptomatik einer ADHS im Verlauf

verändern. Während im Vorschulalter die Hyperaktivität besonders auffällt, führt ab dem Grundschulalter auch die Unaufmerksamkeit vermehrt zu Beeinträchtigungen, da diese bedingt, dass die geforderte Konzentrationsleistung nicht erbracht werden kann. Im Entwicklungsverlauf nimmt die Hyperaktivität und motorische Unruhe meist ab und äußert sich ab dem Jugendalter oft eher in Form einer inneren Unruhe und Anspannung. Unaufmerksamkeit, Organisationsprobleme und Impulsivität persistieren häufig bis ins Erwachsenenalter. Zwar nimmt die Aufmerksamkeitsspanne im Entwicklungsverlauf zu, bleibt aber im Altersvergleich reduziert. Nach einer Längsschnittstudie über vier Jahre mit $N = 128$ Jungen von Biederman, Mick und Faraone (2000) remittiert die ADHS bei etwa 60 % der betroffenen Kinder bis ins Erwachsenalter. Nichtsdestotrotz zeigen etwa 50 % – 80 % auch dann noch vereinzelte Symptome und bis zu einem Drittel erfüllt auch im Erwachsenenalter noch das Vollbild einer ADHS (American Psychiatric Association, 2013; Faraone et al., 2015; Häge et al., 2020).

Aktuellen Studienergebnissen aus Schweden und den USA sowie der interdisziplinären evidenz- und konsensbasierten S3-Leitlinie zu *ADHS im Kindes- und Jugend- und Erwachsenenalter* zufolge leiden insgesamt schätzungsweise 60 % – 90 % der von ADHS betroffenen Kinder an komorbiden psychischen Störungen (Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e. V., Deutsche Gesellschaft für Psychiatrie und Psychotherapie, Psychosomatik und Nervenheilkunde, & Deutsche Gesellschaft für Sozialpädiatrie und Jugendmedizin e.V., 2017; Kadesjö & Gillberg, 2001; Larson, Russ, Kahn, & Halfon, 2011). Besonders hoch ist das Risiko komorbider antisozialer Verhaltensweisen, das sich auch in der kombinierten ICD-10 Diagnose einer *hyperkinetischen Störung des Sozialverhaltens* widerspiegelt (American Psychiatric Association, 2013; World Health Organization, 2011). So weisen etwa 50 % - 60 % der von einer ADHS betroffenen Kinder eine oppositionelle Störung des Sozialverhaltens und 30 % – 50 % eine ausgeprägte Störung des Sozialverhaltens auf (Kadesjö & Gillberg, 2001; Sobanski

et al., 2010; Willcutt, Pennington, Chhabildas, Friedman, & Alexander, 1999). Affektive Störungen wie depressive Störungen treten in 10 % – 40 % der Fälle komorbid auf, wobei die Rate anhand von Selbsteinschätzungen höher ausfallen kann als anhand eines klinischen Urteils (Angold, Costello, & Erkanli, 2003; Popow & Ohmann, 2020; Sobanski et al., 2010). Das komorbide Auftreten von Angststörungen liegt bei etwa 25 % - 40 % (Pliszka, 1998; Sobanski et al., 2010). Ähnlich hoch ist die Komorbiditätsrate von etwa 30 % für Ticstörungen (Comings, 1990; Kadesjö & Gillberg, 2001). Weiterhin treten bei bis zu 50 % der von ADHS betroffenen Kinder Entwicklungs- und Lernstörungen wie Sprachentwicklungs-, Lese-Rechtschreib- oder Rechenstörungen komorbid auf (Kadesjö & Gillberg, 2001).

Ab dem Jugendalter treten häufig auch Substanzmissbrauch und -abhängigkeit komorbid auf, wobei das Risiko hierfür bei gleichzeitig vorliegender Störung des Sozialverhaltens erhöht ist. Die medikamentöse Behandlung der ADHS hingegen senkt das Risiko für das Auftreten von Substanzmissbrauch und -abhängigkeit (Barkley, Fischer, Smallish, & Fletcher, 2004; Biederman et al., 1997; Biederman, Wilens, Mick, Spencer, & Faraone, 1999; Milberger, Biederman, Faraone, Chen, & Jones, 1997).

1.1.3 Ätiologie

Nachdem bisher die Symptome sowie die Auftretenshäufigkeit und der Verlauf der ADHS beschrieben wurden, wird im folgenden Abschnitt auf potentiell ursächliche Faktoren der Störung eingegangen. Dabei werden sowohl biologische als auch umweltbedingte Aspekte betrachtet. Zur besseren Orientierung wird zunächst das in *Abbildung 1* veranschaulichte *Integrative klinische Modell zur Entstehung von ADHS* von Döpfner, Schürmann und Frölich (2019) erläutert.

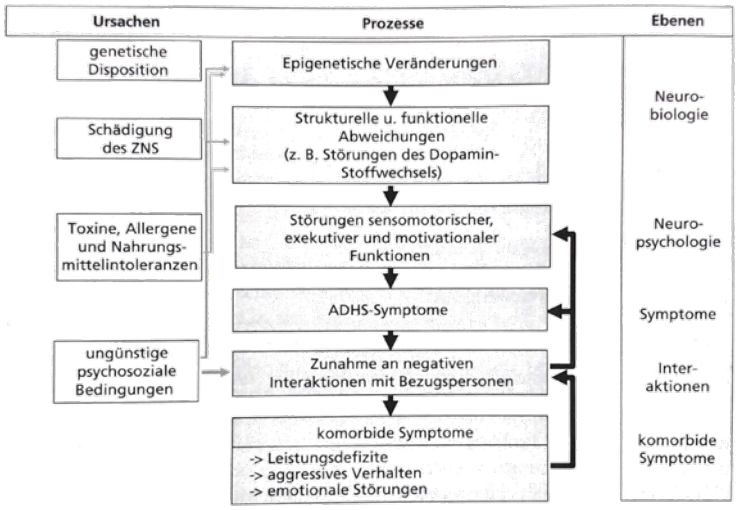

Abbildung 1. Integratives klinisches Modell zur Entstehung von ADHS nach Döpfner et al. (2019).

Dieses Modell spiegelt ein interaktives Konzept der Entstehung einer ADHS wider. Es zeigt den Einfluss unterschiedlicher potentieller Ursachen auf den Entstehungsprozess der Störung und ordnet diese Abläufe unterschiedlichen Ebenen zu. An erster Stelle steht dabei die *genetische Disposition*.

Der genetische Einfluss auf die Entwicklung einer ADHS wurde mittels zahlreicher Studien zur familiären Häufung der Störung untersucht. Die Metaanalyse von Faraone et al. (2005) zeigt dabei anhand von 20 Zwillingsstudien eine genetische Heritabilität der ADHS von etwa 76 % auf. Ferner berichtet Banaschewski (2020) anhand der Zusammenfassung weiterer Studien, dass 10 % – 35 % der Geschwisterkinder und Elternteile eines Kindes mit ADHS selbst an ADHS leiden. Andersherum gibt er an, dass Kinder betroffener Erwachsener zu 40 % – 60 % selbst an einer ADHS erkranken. Auch wenn zahlreiche Kandidatengene für die Ätiologie einer ADHS diskutiert werden, scheinen diese für sich genommen jeweils nur wenig Varianz zu erklären. Aktuell wird daher eher eine komplexe Interaktion unterschiedlicher Genvarianten miteinander und der Umwelt angenommen. Somit wird von einer unter anderem genetisch bedingten neuronalen Entwicklungsstörung ausgegangen

(Banaschewski, 2020; Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e. V. et al., 2017; Popow & Ohmann, 2020).

Neben der genetischen Disposition werden, wie im Modell dargestellt, auch zahlreiche Umweltfaktoren wie z.B. *Schädigungen des Zentralen Nervensystems (ZNS)*, *Toxine* und *ungünstige psychosoziale Bedingungen* im Rahmen einer ADHS als ursächlich erwogen.

Pränatal werden Rauchen in der Schwangerschaft (Holz et al., 2014; Todd & Neuman, 2007) sowie der Konsum von Alkohol bzw. das fetale Alkoholsyndrom im Zusammenhang mit einer ADHS diskutiert (Jensen, Martin, & Cantwell, 1997; Thapar, Cooper, Eyre, & Langley, 2013). Ebenso wird der Einfluss von weiteren Toxinen wie beispielweise Blei aber auch pränataler Sauerstoff-, Eisen und Jodmangel in diesem Kontext in Betracht gezogen. Frühgeburtlichkeit, ein niedriges Geburtsgewicht und perinatale Komplikationen gelten ebenfalls als potentielle Risikofaktoren im Zusammenhang mit einer ADHS. Weiterhin können Hirnschädigungen beispielweise durch Verletzungen oder Infektionen eine ADHS ebenfalls begünstigen. Auch gibt es Hinweise auf Zusammenhänge von Deprivation im frühen Kindesalter, niedrigem soziökonomischen Status, geringer familiärer Unterstützung und negativem elterlichen Erziehungsverhalten sowie psychischen Erkrankungen der Eltern und einer ADHS (Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e. V. et al., 2017; Popow & Ohmann, 2020).

Auch hinsichtlich der Umweltfaktoren lässt sich bisher sagen, dass die einzelnen potentiellen Risikofaktoren bisher nur wenig Varianz zu erklären scheinen (Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie, Psychosomatik und Psychotherapie e. V. et al., 2017), wenngleich eine Verbindung zwischen einer erhöhten Anzahl an Risikofaktoren und einer ernsthafteren Ausprägung der ADHS angenommen wird (Biederman et al., 1995). Insbesondere in Bezug auf psychosoziale Faktoren wird davon ausgegangen, dass diese eher Stärke und Verlauf der Symptomatik als die Entstehung der Störung an sich beeinflussen (Döpfner, Holtmann, & Steinhausen, 2020).

Die erläuterten potentiellen Ursachen beeinflussen auf *neurobiologischer Ebene* dem Modell von Döpfner et al. (2019) entsprechend zunächst einen Prozess der *epigenetischen Veränderungen*. Dieser führt zu einem Prozess *struktureller und funktioneller Abweichungen*, welcher zudem ebenfalls von den potentiell ursächlichen Faktoren beeinflusst wird und auf *neuropsychologischer Ebene* zu *Störungen sensomotorischer, exekutiver und motivationaler Funktionen* führt. In diesem Zusammenhang werden Störungen im Katecholamin-Neurotransmitterstoffwechsel im Rahmen einer ADHS eine wichtige Rolle zugeschrieben. Es wird angenommen, dass es durch diese zu einer reduzierten dopaminergen inhibitorischen Funktion kommt. Weiterhin wird davon ausgegangen, dass dies den für exekutive und soziale Funktionen zuständigen präfrontalen Kortex betrifft sowie den für Aufmerksamkeit- und Auswahlsteuerung zuständigen cingulären Kortex. Des Weiteren werden dopaminerge Neurone im Bereich Motivation, Lernen, Aufrechterhaltung zielorientierten Verhaltens und Kurzzeitgedächtnis als relevant angesehen. Noradrenalinergen Neuronen wird in diesem Zusammenhang eine Bedeutung hinsichtlich der Aufmerksamkeitsaktivierung und -steuerung beigemessen. Auch werden Defizite im Glutamatsystem und im Default Mode Netzwerk im Zusammenhang mit einer ADHS als bedeutsam angesehen.

Einen Erklärungsansatz für den im Modell von Döpfner et al. (2019) dargestellten Einfluss der *Störungen sensomotorischer, exekutiver und motivationaler Funktionen* auf die beobachtbaren *ADHS-Symptome* liefern Sonuga-Barke, Bitsakou und Thompson (2010). Sie konnten bei von ADHS betroffenen Kindern und Jugendlichen Defizite der Inhibitionskontrolle und der zeitlichen Verarbeitung von Reizen sowie eine Verzögerungsaversion aufzeigen, welche in Verbindung mit funktionalen und motivationalen Schwierigkeiten wie z.B. dem Unterdrücken vom Hineinrufen von Antworten oder Schwierigkeiten eines Belohnungsaufschubs gesehen werden können.

Das Modell von Döpfner et al. (2019) geht davon aus, dass *ADHS-Symptome* zu einer *Zunahme an negativen Interaktionen mit Bezugspersonen* führen. Diese beeinflussen dem

Modell zufolge wiederum die *ADHS-Symptome* und die *Störungen sensomotorischer, exekutiver und motivationaler Funktionen*. Außerdem trägt die *Zunahme an negativen Interaktionen mit Bezugspersonen* zur Entwicklung *komorbider Symptome* bei und wird durch diese selbst wieder beeinflusst.

1.2 Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung im schulischen Kontext

Nachdem das Störungsbild einer ADHS im Allgemeinen dargestellt wurde, fokussiert sich der folgende Abschnitt auf die aus der Störung resultierenden Konsequenzen für den schulischen Alltag und die schulische Laufbahn.

1.2.1 Schulische Folgen

Wie bereits beschrieben, wird die ADHS häufig erstmals diagnostiziert, nachdem betroffene Kinder eingeschult wurden, da die Symptome dann dazu führen, dass die Kinder den schulischen Anforderungen nicht gewachsen sind (Campbell et al., 2015). So fallen sie meist schnell durch ihre Hyperaktivität auf, indem sie beispielsweise umherlaufen, auf oder mit dem Stuhl wackeln, mit den Füßen wippen oder mit dem Bleistift auf den Tisch klopfen. Auch mit ihren impulsiven Verhaltensweisen, wie z.B. ununterbrochenem Reden, Hineinrufen in den Unterricht oder Vordrängeln, stechen betroffene Kinder oft schnell heraus. Aber auch in weniger aufsehenerregender Form kann ihre Impulsivität ihnen Schwierigkeiten bereiten: wenn sie beispielsweise mit Aufgaben einfach beginnen ohne sich über die Aufgabenstellung im Klaren zu sein. Erschwerend hinzu kommt dann auch noch die Unaufmerksamkeit, die dazu führt, dass beispielsweise Instruktionen und Erklärungen teilweise nicht gehört bzw. wahrgenommen werden, mit Aufgaben nicht begonnen, sondern umher gestarrt wird und Aufgaben vergessen oder Fehler beim Abschreiben gemacht werden (Hoberg, 2013). Dadurch stört das Verhalten von Schülerinnen und Schülern mit einer ADHS einerseits aktiv den Unterricht, sie werden andererseits aber auch selbst durch die vielen Stimuli in einem

Klassenraum gestört und abgelenkt. Wie bereits erwähnt treten bei 50 % der von ADHS betroffenen Kinder komorbid Entwicklungs- und Lernstörungen wie Sprachentwicklungs-, Lese-Rechtschreib- oder Rechenstörungen auf (Kadesjö & Gillberg, 2001). Darüber hinaus geht eine ADHS bei 50 % – 80 % mit mindestens einem Lerndefizit oder generellen schulischen Leistungsdefiziten einher (DuPaul & Langberg, 2015). Weiterhin konnte eine Metaanalyse von Frazier, Youngstrom, Glutting und Watkins (2007) auf der Grundlage von N = 72 Studien zeigen, dass Kinder mit einer ADHS schlechter in standardisierten Leistungstests, insbesondere im Bereich Lesen, abschneiden sowie häufiger ein Schuljahr wiederholen und die Schule abbrechen als Kinder ohne eine ADHS. Diese Schwierigkeiten wiederum werden als Moderator für ein erhöhtes Delinquenzrisiko in der Zukunft gesehen (DuPaul & Langberg, 2015).

Um diesem negativen Verlauf der schulischen Laufbahn vorzubeugen, können schulische Interventionen in Form von CMS zur Reduktion von ADHS-Symptomen eingesetzt werden. Der folgende Abschnitt geht auf diesen Aspekt genauer ein.

1.2.2 Schulische Interventionsmöglichkeiten

Zur Reduktion der Symptome einer ADHS und damit auch zur Reduktion der Belastung der Lehrkraft sowie zur Verbesserung der Lernumgebung im Klassenzimmer wurden zahlreiche Strategien entwickelt. Diese erzielten laut einer Metaanalyse von Gaastra, Groen, Tucha und Tucha (2016) große Effektstärken (M_{SMD} = 1.82 - M_{SMD} = 3.61) im Vergleich zur Medikation mit Stimulanzien (M_{OR} = 1.36 - M_{OR} = 8.52) oder Psychotherapie (M_{OR} = 0.70 - M_{OR} = 7.02; Catalá-López et al., 2017). Insbesondere da weder medikamentöse noch psychotherapeutische Behandlungen bisher das schulische Funktionsniveau nachweislich signifikant beeinflussen konnten (van der Oord, Prins, Oosterlaan & Emmelkamp, 2008), ist der zusätzliche Einsatz evidenzbasierter CMS für eine umfassende Behandlung und einen positiven Verlauf der Störung unabdingbar.

Dabei zeigten insgesamt behaviorale Strategien Wirksamkeit. Diese können in Antezedens-basierte, Konsequenz-basierte und Selbstmanagement-Strategien unterteilt werden. Zu den Antezedens-basierten Strategien werden Maßnahmen wie z.B. Klassenraumgestaltung oder die Einteilung von Aufgaben in kleinere Teilschritte gezählt, die problematischem Verhalten vorbeugen sollen. In Bezug auf Konsequenz-basierte Strategien, haben sich vor allem ruhige Hinweise (im Einzelkontakt) sowie Verstärkerpläne bewährt. Bei Letzteren sollte auf eine positive Formulierung der Ziele geachtet werden. Auch sollten schulische sowie verhaltensbezogene, aber insgesamt nicht zu viele Ziele aufgenommen werden. Zudem hat sich gezeigt, dass ein integriertes Feedbacksystem sowie die Zusammenarbeit mit Eltern den Nutzen eines Verstärkerplans zusätzlich positiv beeinflusst. Selbstmanagement-Strategien zielen darauf ab, dass Schülerinnen und Schüler sich selbst überwachen, evaluieren und verstärken. Dies kann beispielsweise erreicht werden, indem sie mit Hilfe eines externen Verstärkerplans zunächst angeleitet werden und das Feedback der Lehrkraft nach und nach ausgeschlichen wird, bis die betroffenen Schülerinnen und Schüler sich eigenständig überwachen können (Dupaul & Weyandt, 2006).

Die größten Effektstärken für die Reduktion von störendem und off-task Verhalten von Schülerinnen und Schülern mit ADHS erreichen der Einsatz von Konsequenz-basierten und Selbstmanagement-Strategien. Dabei beeinflussen die Maßnahmen nicht nur ADHS-bedingte Symptome sondern auch das Verhalten von Mitschülerinnen und Mitschülern positiv (Gaastra et al., 2016). Strafbasierte Strategien wie z.B. ein Verweis aus dem Klassenzimmer hingegen sind in der Reduktion ADHS-bedingter Verhaltensauffälligkeiten wenig wirksam (Dupaul & Stoner, 2003).

Trotz dieser Befunde gab bei einer Befragung von Ruhmland und Christiansen (2017) mit $N = 112$ Grundschullehrkräften nahezu die Hälfte an, überwiegend korrektive Strategien, die erst nach Auftreten des schwierigen Verhaltens auf dieses reagieren, zu nutzen (z.B. die Vorgabe von Regeln). Positive Verstärkung wurde in diesem Kontext nur von 11 % der

Befragten genannt. Ein ähnliches Bild zeigt die Auswertung von 2495 Elternberichten von Dupaul, Chronis-Tuscano, Danielson und Visser (2019), wonach mindestens 20 % aller Schülerinnen und Schüler mit ADHS trotz Beeinträchtigung keinerlei schulische Unterstützung erhielten.

Daraus lässt sich schließen, dass die evidenzbasierten CMS bisher noch nicht im schulischen Alltag angekommen und implementiert zu sein scheinen. Mögliche Gründe für diese Implementationslücke sollen im nächsten Abschnitt erläutert werden.

1.3 Einstellung

Der folgende Abschnitt soll auf den potentiellen Einfluss von Einstellung auf den Einsatz von CMS eingehen. Dabei wird zunächst auf die *Theorie des geplanten Verhaltens* von Ajzen (1991) sowie die *Erwartungs-x-Wert-Theorie* von Fishbein und Ajzen (1975) eingegangen. Anschließend wird die Entstehung von in Einstellungen enthaltenen Erwartungen mit Hilfe des *ViolEx-Modells* von Rief et al. (2015) betrachtet.

Die Einstellung einer Person spiegelt ihre Erwartungen sowie ihre Bewertungen dieser wider. Zudem lässt sich dem Faktor Einstellung eine kognitive, affektive und behaviorale bzw. verhaltensbezogene Komponente zuschreiben. Die kognitive Komponente steht für Überzeugungen, die man bzgl. eines Einstellungsobjekts hat. Die affektive Komponente beschreibt Emotionen, von denen man erwartet, dass sie ein Einstellungsobjekt in einem auslöst. Die behaviorale bzw. verhaltensbezogene Einstellungskomponente repräsentiert die Erwartung an das eigene Verhalten gegenüber einem Einstellungsobjekt (Fishbein & Ajzen, 1975; Haddock & Maio, 2014).

1.3.1 Theorie des geplanten Verhaltens

Der *Theorie des geplanten Verhaltens* (englisch: *Theory of planned behavior = TPB*) entsprechend gibt es drei relevante Faktoren, die unsere Verhaltensintention und darüber

schließlich unser Verhalten beeinflussen: *verhaltensbezogene Einstellung (zu einem Einstellungsobjekt)*, *subjektive Norm* und *wahrgenommene Kontrolle*. Als *verhaltensbezogene Einstellung* wird die Erwartung einer (positiven) Konsequenz des eigenen Verhaltens angesehen. Dies lässt sich auf das Verhalten von Lehrkräften gegenüber Schülerinnen und Schülern mit ADHS und deren CMS Einsatz übertragen, indem man die subjektive Effektivitätsbewertung der CMS von Lehrkräften betrachtet. Je effektiver eine Lehrkraft den Einsatz von CMS, der ihr eigenes Handeln darstellt, bewertet, desto mehr erwartet sie eine positive Konsequenz dieser Handlung. *Subjektive Norm* beschreibt, ob einem wichtige Personen das relevante Verhalten befürworten und, ob einem die Meinung dieser Personen wichtig ist. Im hiesigen Kontext wäre somit relevant, ob das Kollegium oder die Schulleitung einer Lehrkraft den Einsatz von CMS unterstützen und ob die individuelle Lehrkraft dieser Meinung Bedeutung beimisst. *Wahrgenommene Kontrolle* steht für die Überzeugung das relevante Verhalten ausführen zu können. Somit muss eine Lehrkraft sowohl von ihren eigenen Fähigkeiten, die CMS nutzen zu können, als auch ggf. von dem Vorhandensein nötiger Rahmenbedingungen überzeugt sein. Der Faktor *Wahrgenommene Kontrolle* beeinflusst dabei nicht nur die Verhaltensintention, sondern auch direkt das Verhalten.

1.3.2 Erwartungs-x-Wert-Theorie

Neben der *verhaltensbezogenen Einstellung (zu einem Einstellungsobjekt)* gibt es auch die *Einstellung zu einem Einstellungsobjekt* (Ajzen, 2005), die im Rahmen dieser Arbeit die Einstellung gegenüber Schülerinnen und Schülern mit ADHS darstellt. Nach der *Erwartungs-x-Wert-Theorie* von Fishbein & Ajzen (1975) wird diese Einstellung gebildet, indem jede Erwartung gegenüber dem Einstellungsobjekt mit der zugehörigen individuellen Bewertung dieser Erwartung multipliziert wird und die Ergebnisse für alle Erwartungen summiert werden. Dabei wird eine Nuancierung der Bewertung von -3 bis +3 vorgeschlagen.

Die *Einstellung zu einem Einstellungsobjekt* umfasst den kognitiven und affektiven Anteil der Einstellung und steht in Beziehung zur *verhaltensbezogenen Einstellung (zu einem Einstellungsobjekt)* (Haddock & Maio, 2014). Die Zusammenhänge der unterschiedlichen Komponenten der Einstellung und die Einordnung in die beschriebenen Modelle wird in *Abbildung 2* veranschaulicht. Außerdem wird beschrieben, wie diese Aspekte auf die Einstellung von Lehrkräften gegenüber Schülerinnen und Schülern mit ADHS und dem Einsatz von CMS übertragen werden können.

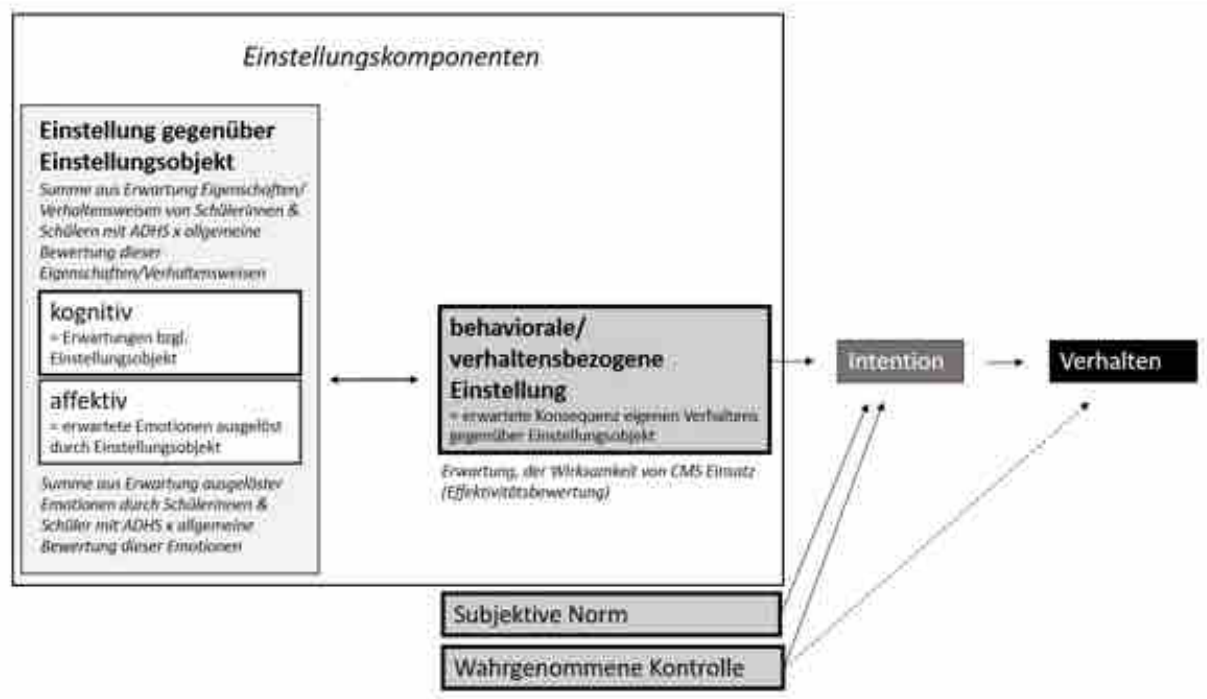

Abbildung 2. Darstellung der Zusammenhänge der unterschiedlichen Komponenten der Einstellung unter Einbezug der *Theorie des geplanten Verhaltens* (Ajzen, 1991) sowie der *Erwartungs-x-Wert Theorie* (Fishbein & Ajzen, 1975).

1.3.3 ViolEx-Modell

Wie bereits beschrieben, entsteht die Einstellung einer Person durch ihre Erwartungen bzgl. eines Einstellungsobjekts. Die Entstehung generalisierter Erwartungen wiederum hängt laut Rief et al. (2015) von direkten Erfahrungen, sozialen Einflüssen sowie individuellen Unterschieden ab. Zudem postulieren Rief et al. (2015) in ihrem *ViolEx-Modell*, dass

erwartungskongruente Erfahrungen die generalisierten Erwartungen verstärken. Erwartungsverletzende Erfahrungen hingegen können unterschiedliche Copingmechanismen aktivieren, die entweder zur Veränderung oder Beibehaltung der generalisierten Erwartungen führen. Das vollständige Originalmodell ist in *Abbildung 3* dargestellt. Erstes Ziel des Projektes *ADHS im Klassenzimmer* und damit der vorliegenden Arbeit war die Erhebung der Erwartungen und Einstellungen von Lehrkräften gegenüber Schülerinnen und Schülern mit ADHS sowie zugehöriger Einflussfaktoren. Diese grundlegenden Erkenntnisse sollen anschließend im weiteren Verlauf des Projekts genutzt werden können, um auch den im Modell dargestellten Bereich der Erwartungsverletzungen genauer zu untersuchen.

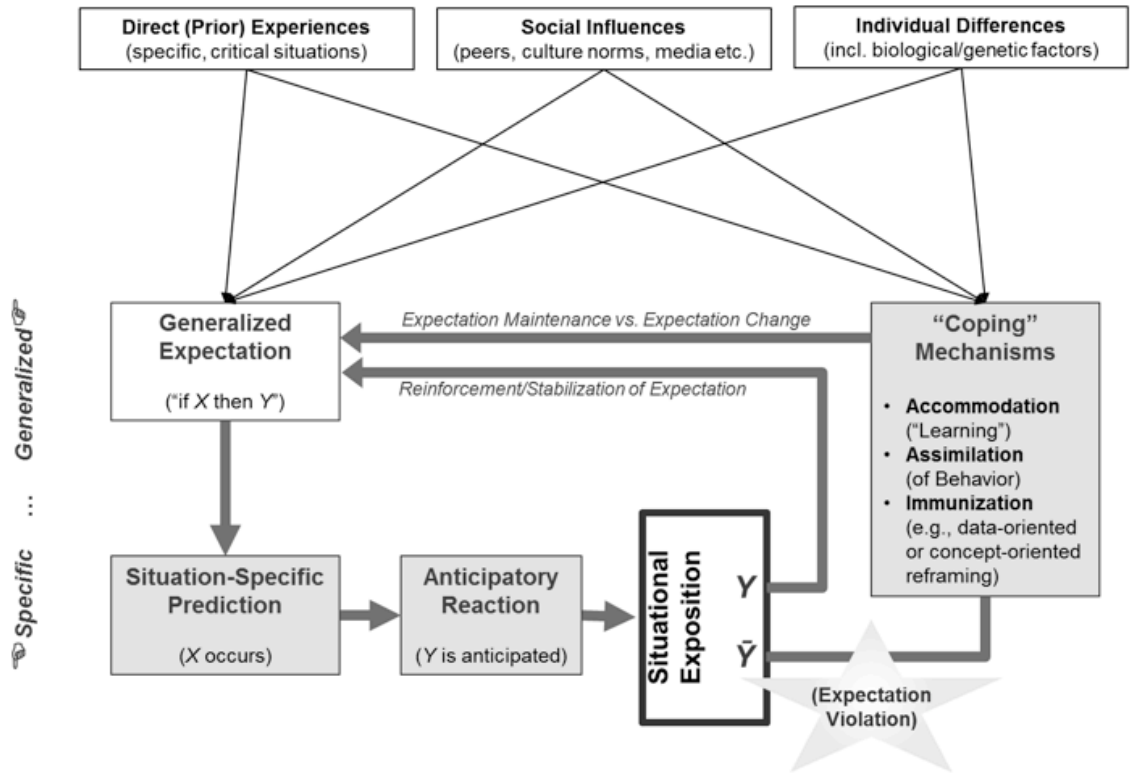

Abbildung 3. Original Abbildung des *ViolEx-Modell* nach (Rief et al., 2015) zur Entstehung und Verstärkung bzw. Beibehaltung oder Veränderung von Erwartungen.

1.3.4 Bisherige Befunde im schulischen Kontext

Die Annahme des Einflusses von Einstellungen und darin erhaltenen Erwartungen von Lehrkräften auf ihr eigenes Verhalten und ihre Schülerinnen und Schüler fand nicht nur in den erläuterten theoretischen Modellen sondern auch in früheren Studien Unterstützung.

Rosenthal und Jacobson konnten bereits 1968 mit ihren Studien zum Pygmalion-Effekt zeigen, dass positive Erwartungen von Lehrkräften die Leistungen ihrer Schülerinnen und Schüler positiv beeinflussen, selbst wenn Lehrkräfte versuchen, sich neutral zu verhalten. Diese Befunde ließen sich auch in anschließenden Untersuchungen, wie beispielsweise der longitudinalen Studie von Szumski und Karwowski (2019) mit N = 1488 Schülerinnen und Schülern sowie deren Lehrkräften, replizieren. Im Rahmen einer Analyse von 10423 Schülerdaten zeigte sich, dass die schulischen Leistungen von Schülerinnen und Schülern mit ADHS von Lehrkräften sogar niedriger eingeschätzt werden als sie es tatsächlich sind (Metzger, 2015). Somit scheinen Lehrkräfte keine positiven Erwartungen bzgl. der Leistungen dieser Schülerinnen und Schüler zu haben, weshalb auch eine Förderung der Leistungen aufgrund einer positiven Erwartungshaltung unwahrscheinlich ist.

In einer Erhebung mit N = 50 Grundschullehrkräften zum Thema Inklusion zeigte sich, dass die Einstellung der Lehrkräfte den Einsatz differenzierender Unterrichtsstrategien beeinflusst. Darüber hinaus wurde auch deutlich, dass die Einstellung der Lehrkräfte zu sonderpädagogischem Förderbedarf im Bereich emotionale und soziale Entwicklung, zu dem auch ADHS gezählt werden kann, negativer ist als zum Bereich Lernen (Lübke, Meyer, & Christiansen, 2016). Auch hatte der Faktor wahrgenommene Kontrolle in dieser Studie, der *TPB* entsprechend, einen Einfluss auf den Einsatz differenzierender Unterrichtsstrategien.

Im Kontext von ADHS konnten Lee und Witruk (2016a) in einer Studie mit insgesamt N = 956 koreanischen und deutschen Lehrkräften zeigen, dass die Einstellung gegenüber CMS sowie die subjektive Norm die Intention des Einsatzes von CMS beeinflusst. Gleiches galt teilweise für den Faktor der wahrgenommenen Kontrolle.

1.4 Weitere Einflussfaktoren

Neben den bereits erwähnten Erkenntnissen ließen sich in Studien weitere Faktoren identifizieren, die den Einsatz von CMS und/oder die Einstellung beeinflussen und die somit im Kontext dieser Arbeit von Relevanz sind.

1.4.1 Wissen

Ein Faktor, der sowohl im Zusammenhang zum Einsatz von CMS als auch zu Einstellung steht ist Wissen. Lehrkräfte mit mehr Wissen über ADHS geben eine positivere Einstellung zu Schülerinnen und Schülern mit ADHS (Bekle, 2004; Lee & Witruk, 2016b) sowie zum Einsatz von CMS (Ohan et al., 2008) an. Auch berichten sie, mehr unterstützende Verhaltensweisen einzusetzen (Ohan et al., 2008).

1.4.2 Berufserfahrung

Berufserfahrung kann dem *ViolEx-Modell* entsprechend als direkte Erfahrung von Lehrkräften mit Schülerinnen und Schülern mit ADHS gesehen werden und somit in Einstellung enthaltene Erwartungen beeinflussen. Außerdem konnten Lee und Witruk (2016b) zeigen, dass Berufserfahrung, gemessen über die Jahre der Lehrerfahrung, vermittelt über die Variablen Wissen und wahrgenommene Kontrolle, die Einstellung einer Lehrkraft zu Schülerinnen und Schülern mit ADHS beeinflusst.

1.4.3 Belastung und Stress

Bei Betrachtung der vielen Herausforderungen im Klassenraum, bedingt durch die Symptomatik von Schülerinnen und Schülern mit ADHS, ist es nicht verwunderlich, dass Lehrkräfte sich durch Schülerinnen und Schüler mit ADHS gestresster fühlen als durch andere Schülerinnen und Schüler (Greene et al., 2016). Nach dem Job Demands–Resources Model (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001), das den

Untersuchungsergebnissen von Hakanen, Bakker und Schaufeli (2006) zufolge auch für Lehrkräfte angewandt werden kann, stehen diese hohen Anforderungen in Zusammenhang mit den Burnout begünstigenden Faktoren Erschöpfung und Zynismus. Diese wirken sich wiederum negativ auf das Engagement und damit voraussichtlich auch auf den Einsatz von CMS aus. Des Weiteren hat sich ein negativer Zusammenhang zwischen Stress auf Seiten der Lehrkraft und dem Verhältnis von Lehrkraft und Schülerinnen und Schülern gezeigt (Yoon & Jina, 2002). Ein Ergebnis, das ebenfalls eine negative Einstellung der Lehrkraft gegenüber diesen Schülerinnen und Schülern vermuten lässt.

Die Disposition Stressreaktivität wurde in der vorliegenden Arbeit ebenfalls beachtet, da sie den Zusammenhang von Stressor und Stressreaktion moderiert und mit dem Fähigkeitskonzept und somit mit wahrgenommener Kontrolle in Verbindung steht (Cohen et al., 2000; Schulz, Jansen, & Schlotz, 2005).

1.4.4 Persönlichkeit

Ein Einstellung beeinflussender Faktor ist Persönlichkeit (Ajzen & Fishbein, 2005). Diesbezüglich fanden Ekehammar, Akrami, Gylje und Zakrisson (2004), dass insbesondere die Persönlichkeitseigenschaften soziale Dominanzorientierung (SDO) und rechtsgerichteter Autoritarismus (engl. right-wing-authoritarianism = RWA) sowie über diese vermittelt die Big Five Persönlichkeitseigenschaften im Zusammenhang mit Vorurteilen stehen. Die Persönlichkeitseigenschaft RWA beschreibt die Bereitschaft, sich Autoritäten unterzuordnen (Altemeyer, 1981) und wurde auf Basis der Untersuchungen von Adorno, Frenkel-Brunswik, Levinson und Sanford (1950) zur Neigung zu Vorurteilen gegenüber Minderheiten entwickelt. SDO repräsentiert die Präferenz hierarchischer gegenüber gleichberechtigter Strukturen (Pratto, Sidanius, Stallworth, & Malle, 1994).

1.5 Zusammenführung der Modelle und Einordnung der Einflussfaktoren

Wie bereits beschrieben, basiert die vorliegende Arbeit auf der *TPB* sowie dem ersten Teil des *ViolEx-Modells* zur Entstehung der in Einstellung erhaltenen Erwartungen. In *Abbildung 4* wird die theoretische Zusammenführung dieser beiden Modelle sowie die theoretische Einordnung der beschriebenen Einflussfaktoren veranschaulicht. Die dargestellten Pfade sind auf die der theoretischen Modelle begrenzt.

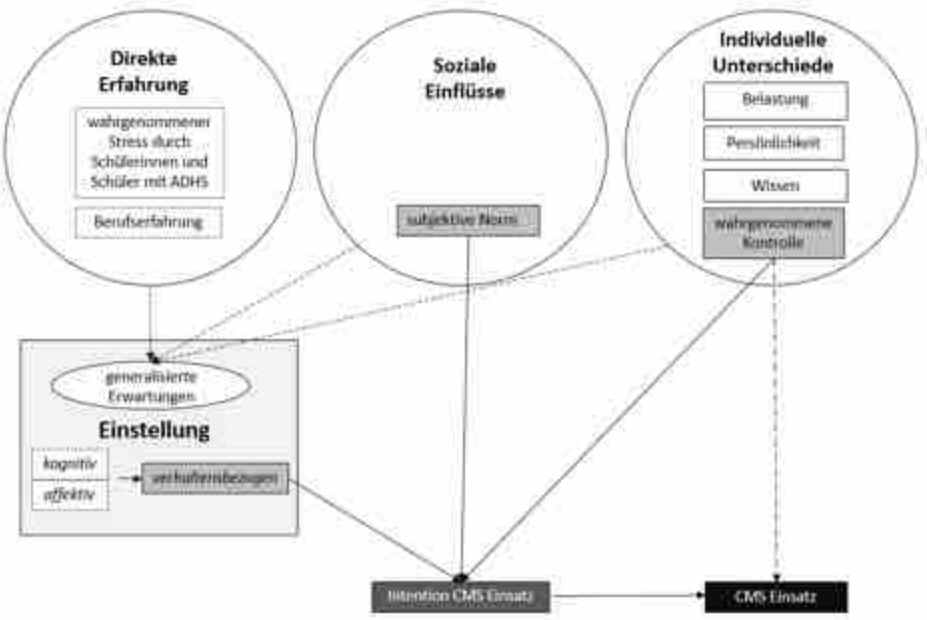

Abbildung 4. Theoretische Zusammenführung der *Theorie des geplanten Verhaltens* (Ajzen, 1991) und des *ViolEx-Modells* (Rief et al., 2015) sowie theoretische Einordnung der Einflussfaktoren auf Einstellung und den Einsatz von CMS in das zusammengeführte Modell.

2 Zielsetzung der Dissertation

Das übergeordnete Ziel dieser Arbeit stellt die Untersuchung potentieller Gründe für die fehlende Implementation der evidenzbasierten CMS für Schülerinnern und Schüler mit ADHS in den schulischen Alltag dar. Besonderes Augenmerk liegt, auf Basis der aufgeführten theoretischen Modelle und der bisherigen Befunde, auf der Einstellung und den darin enthaltenen Erwartungen von Lehrkräften zu Schülerinnen und Schülern mit ADHS sowie zum Einsatz von CMS. Die Arbeit ist Teil des von der Deutschen Forschungsgemeinschaft

finanzierten Projekts *ADHS im Klassenzimmer*, welches dem Graduiertenkolleg *Beibehaltung vs. Veränderung von Erwartungen im Kontext von Erwartungsverletzungen* zugeordnet ist. Die Ergebnisse sollen daher im Anschluss dazu dienen, im Rahmen des Projekts *ADHS im Klassenzimmer* auch den Umgang von Lehrkräften mit Erwartungsverletzungen in diesem Kontext näher zu untersuchen. Letztlich soll durch die Erkenntnisse des Projekts die bisher existierende Implementationslücke geschlossen werden, um die Symptome von Schülerinnen und Schülern mit ADHS zu reduzieren und so eine positivere Lernumgebung für sie sowie ihre Klassenverbände und Lehrkräfte zu schaffen.

2.1 Zielsetzung Studie 1

Mit Hilfe eines Bibliometric reviews soll zunächst die wissenschaftliche Kommunikation der Forschungsfelder Psychologie/Psychiatrie und Pädagogik bezogen auf das Thema CMS für Schülerinnen und Schüler mit ADHS betrachtet werden. Es wird vermutet, dass ein Grund für die fehlende Implementation der CMS in den schulischen Alltag bereits darin liegen könnte, dass Forschungsergebnisse zu ADHS vornehmlich im Bereich Psychologie/Psychiatrie gewonnen, jedoch im Bereich Pädagogik nicht ausreichend kommuniziert werden und daher Praktiker*innen wie Lehrkräfte nicht erreichen. Deshalb soll mittels bibliometrischer Methoden quantitativ für beide Forschungsfelder die Basis des aktuellen Wissens über CMS für Schülerinnen und Schüler mit ADHS erhoben und verglichen werden. Auf diese Weise soll der Frage nachgegangen werden, ob ein (ausreichender) Wissensaustausch zwischen den Forschungsfeldern stattfindet. Auch sollen aktuelle Forschungsansätze der beiden Forschungsfelder mit bibliometrischen Methoden miteinander verglichen werden, um die möglicherweise unterschiedlichen Schwerpunkte zu identifizieren und herauszufinden, ob Implementationsforschung aktuell forciert wird. Dadurch sollen Forschungslücken sowie Potential für fachübergreifendes Lernen aufgezeigt werden.

2.2 Zielsetzung Studie 2

Da, wie bereits beschrieben, unterschiedliche Faktoren den Einsatz von CMS beeinflussen können, sollen die Stärken dieser Einflüsse überprüft werden. Hierfür ist es notwendig, alle zu untersuchenden Variablen adäquat zu erfassen. Da bestehende Instrumente zur Erhebung von Wissen über und Einstellung zu ADHS bedeutsame Schwächen in der Nachvollziehbarkeit ihrer inhaltlichen Validität aufweisen, wird zunächst der *ADHS-Schul-Erwartungsfragebogen* (*ASE*) mit einer Wissens-, einer Einstellungs- sowie einer Interventionsskala entwickelt. Diesen gilt es anschließend in einer Validierungsstudie auf seine psychometrischen Maße und seine Anwendbarkeit zur Erfassung von Wissen von Lehrkräften über ADHS, Einstellung von Lehrkräften zu Schülerinnen und Schülern mit ADHS sowie zu entsprechenden CMS und dem Einsatz dieser zu überprüfen, um ihn in nachfolgenden Forschungsarbeiten einsetzen zu können.

2.3 Zielsetzung Studie 3

Die, der *Erwartungs-x-Wert Theorie* entsprechenden, unterschiedlichen Möglichkeiten zur Ausbildung einer Einstellung sollen mit einem Gruppenvergleich von Lehramtsstudierenden, Lehrkräften und Psychotherapeut*innen in Ausbildung (PiAs) sowie einer latenten Profilanalyse untersucht werden. Da Psychotherapeut*innen eine Berufsgruppe repräsentieren, die ebenfalls häufig mit Kindern und Jugendlichen mit ADHS arbeitet, sich im Gegensatz zu Lehrkräften aber explizit für die Arbeit mit beeinträchtigten und verhaltensauffälligen Kindern entschieden hat, soll ermittelt werden, ob ihre Einstellung sich von der von Lehrkräften bzw. Lehramtsstudierenden unterscheidet. Außerdem sollen latente Einstellungsprofile identifiziert und auf Unterschiede in weiteren Variablen wie z.B. Wissen über ADHS hin analysiert werden. So soll herausgefunden werden, welches Einstellungsprofil

für Fachkräfte, die mit Kindern mit ADHS arbeiten, von Vorteil wäre, um eine angenehme Lern- bzw. Arbeitsumgebung für alle Beteiligten zu schaffen.

2.4 Zielsetzung Studie 4

In einer ersten Studie zur Pfadmodellanalyse soll Anhand einer Stichprobe von Lehramtsstudierenden untersucht werden, welchen Einfluss die Variablen subjektive Norm, wahrgenommene Kontrolle, Wissen, allgemeine Belastung, wahrgenommener Stress durch Schülerinnen und Schüler mit ADHS, Persönlichkeit und die Einstellung zu Schülerinnen und Schülern mit ADHS auf die Einstellung zu CMS und die Intention, diese zu nutzen, ausüben. Konkret wird gefragt, ob die Intention, (in)effektive CMS zu nutzen, durch die Einstellung zu diesen sowie durch die weiteren Variablen erklärt werden kann. Auch soll geklärt werden, ob alle Variablen, die die Einstellung zu (in)effektiven CMS beeinflussen, über diese vermittelt, auch einen Einfluss auf die Intention der Nutzung von (in)effektiven CMS ausüben. Auf diese Weise soll überprüft werden, welche Variablen bei Lehramtsstudierenden bzgl. der Nutzung (in)effektiver CMS besonders von Bedeutung sind und daher in der Ausbildung von Lehramtsstudieren berücksichtigt werden sollten.

2.5 Zielsetzung Studie 5

Anhand einer Stichprobe mit Lehrkräften soll in einer zweiten Studie zur Pfadmodellanalyse untersucht werden, ob sich das Modell für Lehramtsstudierende auch für Lehrkräfte replizieren lässt. Darüber hinaus soll analysiert werden, ob die Variable Berufserfahrung einen zusätzlichen Beitrag zur Varianzaufklärung innerhalb des Modells liefert. Hierfür sollen nicht nur die Berufsjahre betrachtet werden, sondern auch die Schulform, an der Lehrkräfte tätig sind. Diesbezüglich wird vermutet, dass sich Grundschul- sowie Förderschullehrkräfte von Mittel- und Oberstufenlehrkräften, aufgrund ihrer Ausbildungsunterschiede und der Kontakthäufigkeit mit Schülerinnen und Schülern mit deutlich wahrnehmbaren ADHS-bezogenen Verhaltensauffälligkeiten, unterscheiden. Da die

Gesamtpopulation der Lehrkräfte i.d.R. heterogener ist als die der Lehramtsstudierenden, soll außerdem der Mehrwert einer Erweiterung des Modells um die demographischen Variablen Geschlecht und Alter geprüft werden.

3 Zusammenfassung der Studien

Im Folgenden werden die dieser Dissertation zugrundeliegenden Studien zusammengefasst. Die vollständigen Artikel finden sich im *Anhang*.

3.1 Zusammenfassung Studie 1

Bibliometric Review: Classroom Management in ADHD – Is There a Communication Gap Concerning Knowledge Between the Scientific Fields Psychiatry/Psychology and Education?

> Dort, M., Strelow, A. E., French, B., Groom, M., Luman, M., Thorell, L. B., . . . Christiansen, H. (2020). Bibliometric Review: Classroom Management in ADHD—Is There a Communication Gap Concerning Knowledge Between the Scientific Fields Psychiatry/Psychology and Education? *Sustainability*, *12*(17), 6826. https://doi.org/10.3390/su12176826

Theoretischer Hintergrund: Bei der Mehrheit aller Schülerinnen und Schüler mit ADHS geht diese Störung mit schulischen Lern- und Leistungsschwierigkeiten einher (DuPaul & Langberg, 2015; Frazier et al., 2007). Der Einsatz von CMS zeigt nach einer Metaanalyse von Gaastra et al. (2016) große Effekte in der Reduktion der mit der Störung einhergehenden Verhaltensschwierigkeiten. Nichtsdestotrotz scheinen diese CMS bisher nicht im schulischen Alltag angekommen zu sein (Ruhmland & Christiansen, 2017). Diese Implementationslücke könnte durch eine Wissenslücke zwischen den Forschungsfeldern Psychologie/Psychiatrie und Pädagogik begründet sein. Möglicherweise setzen die beiden Felder unterschiedliche Schwerpunkte bzgl. der Behandlung von bzw. des Umgangs mit ADHS und integrieren ihre Forschungsergebnisse nicht (ausreichend). Diese Studie fokussiert die Fragen a) was ist die Basis des aktuellen Wissensstandes der beiden Forschungsbereiche, b) wie vergleichbar sind

aktuelle Forschungsansätze der beiden Forschungsbereiche und c) sind Methoden zur Implementation und potentielle Barrieren aktuelle Forschungsthemen? Um diese Fragen zu untersuchen und Potential für fachübergreifendes Lernen sowie zukünftige Forschung aufzuzeigen wird science mapping genutzt. Dieses repräsentiert eine quantitative bibliometrische Methode, die es ermöglicht, die Literatur und damit das Wissen eines Forschungsbereichs darzustellen und so den Austausch zwischen Forschungsbereichen zu analysieren.

Methode: Die Daten wurden mit Hilfe des *Social Sciences Citation Index*®(SSCI) bei *Web of Science* gewonnen, da dies die gängigste Datenbank in den untersuchten Forschungsbereichen darstellt und alle für eine bibliometrische Analyse notwendigen Metadaten (Titel, Autor, Abstract, Keywords, Referenzen, Journal, Jahr) liefert. Wie für bibliometrische Analysen üblich, wurde die Suche auf eine Datenbank begrenzt. Der Suchterm fokussierte die Verbindung von CMS mit ADHS und basierte auf dem Suchterm der Metaanalyse von Gaastra et al. (2016) sowie auf relevanten Keywords in der gesuchten Literatur. Die Suche ergab für den Zeitraum von 1900 bis 2019 $N = 422$ Ergebnisse für den Forschungsbereich Psychologie/Psychiatrie und $N = 143$ Ergebnisse für den Bereich Pädagogik mit einer Überlappung von 40 Dokumenten (7 %). Für den Zeitraum von 2015 – 2019 ergaben sich für den Forschungsbereich Psychologie/Psychiatrie $N = 151$ Ergebnisse und für den Bereich Pädagogik $N = 76$, mit einer Überlappung von 11 Dokumenten (5 %). Es wurden jedoch Texttypen, die die entsprechenden Metadaten nicht enthalten z.B. Meetingsabstracts etc. ausgeschlossen. Individuelle Co-citation Analysen für die beiden Forschungsbereiche wurden durchgeführt, um die Basis des aktuellen Wissensstands zu ermitteln. Diese Analysemethode verbindet und clustert Dokumente auf Basis ihres gemeinsamen Auftretens in Referenzlisten (McCain, 1990). Um die Ähnlichkeit der aktuellen Forschungsansätze zu vergleichen und zu untersuchen, ob Implementationsmethoden und -barrieren aktuelle Forschungsthemen widerspiegeln, wurde Bibliographic coupling angewandt, das Dokumente anhand der Anzahl

analoger Referenzen verbindet und clustert (Kessler, 1963; Zupic & Čater, 2015). Die Cluster wurden anschließend anhand der Autoren, Titel, Abstracts und Jahre der zugehörigen Dokumente inhaltlich analysiert.

Ergebnisse: Der Großteil der Forschung ist im Forschungsbereich Psychologie/Psychiatrie angesiedelt. Die Co-citation Analysen ergaben sechs Cluster für den Forschungsbereich Psychologie/Psychiatrie (1. *Das Ansehen von ADHS in der Schule; psychosoziale Behandlung*, 2. *medikamentöse, behaviorale und kognitive Behandlung; ADHS Begleiterscheinungen*, 3. *Vergeich und Kombination von Behandlungen; familienbasierte Einflussfaktoren*, 4. *Schulisches Funktionsniveau; Forschungsmethoden*, 5. *Schulische Leistung; Umgang mit Störverhalten*, 6. *Das Konzept ADHS über die Lebensspanne*) und fünf für den Forschungsbereich Pädagogik (1. *Die Wahrnehmung und der Umgang von Lehrkräften mit herausforderndem Verhalten*, 2. *Evidenzbasierte Klassenrauminterventionen; vereinzelte Ansätze*, 3. *Selbstmanagement und Anleitung für Schülerinnen und Schüler mit ADHS*, 4. *Wahrnehmung und Wissen von Lehrkräften über ADHS; Interventionseffekte*, 5. *Diagnose und Behandlung von ADHS gemäß DSM IV und älter*). Viele Cluster der beiden Forschungsbereiche zeigten vergleichbare Themen. Ein lehrkraftzentriertes Cluster ergab sich nur für den Forschungsbereich Pädagogik. Die Bibliographic coupling Analyse ergab acht Cluster (1. *Treatment-Effekte und Wahrnehmung von ADHS*, 2. *herausfordernde Verhaltensprobleme*, 3. *Programme; Bedeutung von ADHS in Schule, Familie und Gesellschaft*, 4. *Selbstwirksamkeit; Wissen über ADHS*, 5. *Treatment-Effekt-Studien*, 6. *Moderatoren von Treatment-Effekten*, 7. *Die Rolle von Eltern/Familie*, 8. *Implementationsstrategien*) mit Literatur aus beiden Forschungsbereichen und wenigen Studien zu Implementationsmethoden und –barrieren.

Diskussion: Der Bibliometric review zeigt, dass das Interesse an dem Thema CMS für Schülerinnen und Schüler mit ADHS insbesondere in den USA zunächst ab 2003 im Forschungsbereich Psychologie/Psychiatrie und später ab 2014 auch im Forschungsbereich

Pädagogik zugenommen hat. Das Interesse scheint damit nach der Erlassung des *No Child Left Behind* (NCLB) Gesetzes im Jahre 2002, das die Förderung von Kindern mit Schwierigkeiten fordert (Hursh, 2004), gestiegen zu sein. Des Weiteren zeigt sich, dass die beiden Forschungsbereiche sich in den vergangenen Jahren ähnlichen Inhalten widmen. Der Forschungsbereich Psychologie/Psychiatrie scheint dabei viele unterschiedliche Facetten des Themas zu betrachten. Ein Fokus auf der Sichtweise der Lehrkräfte und ihrem Umgang mit ADHS-bedingten Verhaltensschwierigkeiten wird nur im Forschungsbereich Pädagogik deutlich. Insgesamt wirkt die Basis des aktuellen Wissens der beiden Forschungsbereiche trotz ähnlicher Inhalte nicht miteinander verbunden. In den vergangenen Jahren hat sich dies, den Ergebnissen der Bibliographic coupling Analyse zufolge, vermutlich verbessert, da die resultierten Cluster Literatur aus beiden Forschungsbereichen enthalten und eine hohe Konnektivität aufweisen. Jedoch wird auch hier deutlich, dass sich verstärkt der Forschungsbereich Pädagogik mit herausforderndem Verhalten beschäftigt. Implementationsmethoden und potentiellen –barrieren wird sich insgesamt bisher wenig gewidmet. Um die aktuelle Implementationslücke zu schließen, sollte der Fokus auf diesen Bereich verstärkt werden. Zudem sollte der Umgang mit herausforderndem Verhalten von Seiten des Forschungsbereich Psychologie/Psychiatrie mehr berücksichtigt werden, um Praktiker in der Kooperation mit Lehrkräften zu unterstützen.

3.2 Zusammenfassung Studie 2

What teachers think and know about ADHD: Validation of the ADHD-school-expectation questionnaire (ASE)

Dort, M., Strelow, A., Schwinger, M., & Christiansen, H. (2020). What Teachers Think and Know about ADHD: Validation of the ADHD-school-expectation Questionnaire (ASE). *International Journal of Disability, Development and Education*, *3*(2), 1–14. https://doi.org/10.1080/1034912X.2020.1843142

Theoretischer Hintergrund: Evidenzbasierte CMS für Schülerinnen und Schüler mit ADHS scheinen bisher nicht im schulischen Alltag angekommen zu sein, obwohl im Durchschnitt

etwa ein bis zwei Schülerinnen bzw. Schüler pro Klasse von der Störung betroffen sind (Polanczyk et al., 2014; Ruhmland & Christiansen, 2017). Ein relevanter Faktor für diese Implementationslücke könnte das Wissen der Lehrkräfte über ADHS sein. So fanden Ohan et al. (2008), dass Lehrkräfte mit moderatem bis hohem Wissen über ADHS schulische und häusliche Unterstützung für Schülerinnen und Schüler mit ADHS fördern. Insgesamt scheint das Wissen über ADHS bei Lehrkräften jedoch eher gering und geprägt durch falsche Informationen (Ruhmland & Christiansen, 2017; Soroa, Gorostiaga, & Balluerka, 2016). Dies könnte zu einer negativen Wahrnehmung von Schülerinnen und Schülern mit ADHS führen und eine negative Einstellung zu diesen begünstigen. Die Einstellung zu Schülerinnen und Schülern mit ADHS wiederum kann die Einstellung zum Verhalten ihnen gegenüber und damit die Einstellung zum Einsatz von CMS beeinflussen. Die Einstellung zum Einsatz von CMS abermals kann, der *TPB* sowie ersten Studienerkenntnissen zum Einsatz differenzierender Strategien entsprechend, die Umsetzung dieser CMS beeinflussen (Ajzen, 1991; Haddock & Maio, 2014; Lübke et al., 2016). Um die Zusammenhänge der Variablen Wissen, Einstellung und CMS-Einsatz zu untersuchen, ist ein valides Instrument notwendig. Da bisherige Instrumente Schwächen in der Inhaltsvalidität aufzeigen, wurde der *ADHS-Schul-Erwartungsfragebogen* (*ASE*) entwickelt und wird in dieser Studie validiert.

Methode: Die Datenerhebung erfolgte mittels online-Umfrage. Die Validierung basierte auf einer Stichprobe von $N = 1086$ Lehramtsstudierenden (Alter $M = 23.22$; $SD = 3.93$; 30.57 % männlich, 68.97 % weiblich, 0.46 % divers) und wurde anschließend anhand einer Stichprobe von $N = 599$ Lehrkräften (Alter $M = 41.33$; $SD = 10.01$; 17.67 % männlich, 82.30 % weiblich) repliziert. Der *ASE* besteht aus einer Wissensskala mit insgesamt 24 Items, je sechs aus den vier Bereichen *Symptome*, *Ätiologie, Diagnostik & Prävalenz* und *Interventionen*, die auf einer visuellen Analogskala (VAS) von *richtig* bis *falsch* zu beantworten sind. Die VAS ist in zwölf nicht sichtbare Abschnitte unterteilt, so dass der Cursor sich noch flüssig bewegte. Nur eine korrekte Antwort innerhalb des ersten Sechstels der VAS, wird mit einem Punkt

bewertet. Die Einstellungsskala besteht aus 33 Items zur Erfassung der Einstellung zu Schülerinnen und Schülern mit ADHS. Sie basiert auf der *Erwartungs-x-Wert-Theorie* und enthält Erwartungen bzgl. des Verhaltens und der Eigenschaften von Schülerinnen und Schülern mit ADHS (kognitive Einstellungskomponente) sowie bzgl. der durch sie ausgelösten Emotionen (affektive Einstellungskomponente). Zudem erfasst sie die Bewertung dieser Erwartungen. Die Erwartungswahrscheinlichkeit muss auf einer VAS von 0 = *unwahrscheinlich* bis 1 = *wahrscheinlich* und die Bewertung auf einer VAS von -3 = *negativ* bis 3 = *positiv* angegeben werden. Die Interventionsskala umfasst insgesamt 27 Items, 15 effektive und zwölf ineffektive Strategien, die neutral formuliert sind. Für diese muss auf einer VAS der (geschätzte) Einsatz von 0 = *nie* bis 1 = *sehr oft* und auf einer anderen VAS die Effektivitätsbewertung, die die Einstellung zu den Strategien wiederspiegelt, von 0 = *überhaupt nicht effektiv* bis 1 = *sehr effektiv* angegeben werden. Die inhaltliche Validität der Wissensskala und der Einstellungsskala wurden mit konfirmatorischen Faktorenanalysen (KFA) überprüft. Für die Wissensskala wurden drei und für die Einstellungsskala zwei sich im Detailgrad unterscheidende Modelle untersucht. Auch wurde eine explorative Faktorenanalyse (EFA) berechnet. Die Entwicklung der Interventionsskala basierte auf bisherigen Studienergebnissen zur Effektivität von CMS und wurde daher nicht auf Faktoren hin untersucht.

Ergebnisse: Für die Wissensskala ergab ein Bi-Faktor Modell, bestehend aus den vier Wissenskategorien, zusätzlich unterteilt in korrekt und inkorrekt formuliert, sowie einem allgemeinen Wissensfaktor, einen guten Modellfit: χ^2/df = 1.88, RMSEA = 0.03, CFI = 0.95 und NFI = 0.90. Die Berechnung der internen Konsistenz ergab mit Cronbachs α .80 eine gute Reliabilität. Die Untersuchung der Einstellungsskala mittels KFA führte nicht zu zufriedenstellenden Ergebnissen. Eine EFA ergab nach Kaiserkriterium sechs Faktoren: 1.) *positives Verhalten* (Eigenwert = 6.05), 2.) *negatives Verhalten* (Eigenwert = 5.68), 3.) *negative Emotionen* (Eigenwert = 1.80), 4.) *herausragend negatives Verhalten* (Eigenwert =

1.68), 5.) *herausragend positives Verhalten* (Eigenwert = 1.04), 6.) *positive Emotionen* (Eigenwert = 1.01). Der Screetest wies auf zwei Faktoren hin: 1.) *negative Aspekte* (Eigenwert = 6.05), 2.) *positive Aspekte* (Eigenwert = 5.68). Für die Gesamtskala (Cronbachs α = .85) und für die Subskalen *negative* bzw. *positive Aspekte* (Cronbachs α jeweils .87) ergaben sich gute interne Konsistenzwerte. Die Berechnung der internen Konsistenz der Interventionsskala ergab für den Einsatz sowie die Effektivitätsbewertung von CMS jeweils Cronbachs α = .73 und deutete somit auf eine gute Reliabilität. Die hier berichteten Ergebnisse auf Grundlage der Daten der Lehramtsstudierenden konnten mit den Daten der Lehrkräfte repliziert werden.

Diskussion: Die Validierungsstudie kann gute psychometrische Maße des *ASEs* sowie theoriebasierte inhaltliche Validität und die Fähigkeit zur Erfassung von Wissen über ADHS, Einstellung zu Schülerinnen und Schülern mit ADHS und Einstellung zu sowie Einsatz von CMS für Schülerinnen und Schüler mit ADHS nachweisen. Die KFA der Wissensskala unterstützt ein Bi-Faktor-Modell, das die zentralen Aspekte der Skalenentwicklung abbildet und daher auf Konstrukt- sowie inhaltliche Validität hinweist. Für die Einstellungsskala zeigen sich mittels EFA zwei bzw. in einer detaillierten Lösung sechs Faktoren. Diese repräsentieren unterschiedliche Nuancen der positiven und negativen Bewertung und diskriminieren zwischen kognitiven und affektiven Items und decken somit die zentralen Aspekte, die der Entwicklung der Einstellungsskala zugrunde gelegt wurden, ab. Aufgrund der besseren Überschaubarkeit wird die Lösung mit zwei Faktoren bevorzugt. Der *ASE* kann somit für die Untersuchung der Zusammenhänge von Wissen über ADHS, Einstellung zu Schülerinnen und Schülern mit ADHS sowie der Einstellung zu und dem Einsatz von CMS eingesetzt werden. Auch können mit Hilfe des *ASEs* inter- und intra-individuelle Veränderungen und die Effektivität von Implementationsprogrammen analysiert werden. Durch die einfache Adaptierbarkeit kann der *ASE* darüber hinaus auch für die Erhebung der Einstellung zu anderen Schülerinnen und Schülern eingesetzt werden. Als ein limitierender

Faktor der Validierungsstudie ist die Bi-Faktorlösung der Wissensskala zu nennen, die die Möglichkeit zur Bildung von Subskalen begrenzt. Außerdem ist die Einstellungsskala auf Erwartungen hinsichtlich Unterrichtssituationen begrenzt. Es ist jedoch nicht auszuschließen, dass beispielsweise auch Pausen- oder Hausaufgabensituationen die Einstellung von Lehrkräften zu Schülerinnen und Schülern mit ADHS beeinflussen. Weiterhin wären Hinweise über die Zusammenhänge der, durch den *ASE* erhobenen, Variablen zu anderen Maßen bzw. externen Kriterien wünschenswert. Insgesamt konnte diese Studie jedoch zeigen, dass mit dem *ASE* ein theoriebasiertes, inhaltlich valides und reliables Messinstrument entwickelt wurde, das die Schwachstellen vorheriger Messinstrumente korrigiert.

3.3 Zusammenfassung Studie 3

Working with Children with ADHD: A Latent Profile Analysis of Teachers' and Psychotherapists' Attitudes

Dort, M., Strelow, A. E., Schwinger, M., & Christiansen, H. (2020). Working with Children with ADHD—A Latent Profile Analysis of Teachers' and Psychotherapists' Attitudes. *Sustainability*, *12*(22), 9691. https://doi.org/10.3390/su12229691

Theoretischer Hintergrund: Statistisch gesehen leiden ein bis zwei Schülerinnen oder Schüler pro Klasse an einer ADHS (Polanczyk et al., 2014), die häufig erstmals diagnostiziert wird, wenn betroffene Kinder eingeschult und den schulischen Anforderungen aufgrund ihrer Symptomatik nicht gerecht werden (Campbell et al., 2015). Somit sind ab dem Schulalter sowohl Lehrkräfte als auch Psychotherapeut*innen als Fachkräfte häufig in Kontakt mit Kindern mit ADHS. Ihre Einstellung zu diesen Kindern kann ihre Einstellung bzgl. ihres Verhaltens diesen Kindern gegenüber beeinflussen (Haddock & Maio, 2014). Die verhaltensbezogene Einstellung bestimmt der *TPB* entsprechend, vermittelt über die Verhaltensintention, auch das Verhalten der Fachkräfte mit. Durch ihr Verhalten wiederum können diese Fachkräfte beispielweise durch den Einsatz von CMS die ADHS-Symptome betroffener Kinder reduzieren. Bisher wurde, nach aktuellem Wissensstand, die Einstellung

von Psychotherapeut*innen bzw. Psychotherapeut*innen in Ausbildung (PiAs) zu Kindern mit ADHS nicht untersucht. Deshalb und da angenommen wird, dass diese positiver ausfällt als die von Lehrkräften, soll die Einstellung von PiAs mit der Einstellung von Lehrkräften in dieser Studie verglichen werden. Da Einstellung nach der *Erwartungs-x-Wert-Theorie* auf Erwartungen und der Bewertungen dieser basiert, kann die Ausbildung dieser Variablen individuell unterschiedlich aussehen. Aus diesem Grund zielt diese Studie darauf ab, latente Einstellungsprofile zu identifizieren. Zusätzlich soll untersucht werden, wie sie sich in Variablen unterscheiden, die nach dem *ViolEx-Modell* in Einstellung enthaltene Erwartungen beeinflussen. Auf diese Art und Weise soll geprüft werden, welches Einstellungsprofil für Fachkräfte, die mit Kindern mit ADHS arbeiten, vorteilhaft wäre.

Methode: Die Studie basierte auf den Daten von $N = 1794$ Teilnehmer*innen und wurde über drei online-Umfragen realisiert ($N = 1086$ Lehramtsstudierende, $M = 23.22$ Jahre; $SD = 3.93$ Jahre; 30.57 % männlich, 68.97 % weiblich, 0.46 % divers; $N = 599$ Lehrkräfte, $M = 41.33$ Jahre; $SD = 10.01$ Jahre; 17.67 % männlich, 82.30 % weiblich; $N = 109$ PiAs, $M = 30.94$ Jahre; $SD = 5.24$ Jahre; 19.27 % männlich, 80.73 % weiblich). Die Einstellung der Teilnehmer*innen zu Kindern mit ADHS wurde mit der Einstellungsskala des *ASE* (Dort, Strelow, Schwinger, & Christiansen, in press) erhoben. Weiterhin wurden als mögliche Einflussvariablen mit dem *ASE* das Wissen über ADHS und die Einstellung zu sowie der Einsatz von CMS erfasst. Mit selbst entwickelten Items wurden die Selbsteinschätzung der Einstellung zu Kindern mit ADHS, der wahrgenommene Stress durch Kinder mit ADHS sowie die wahrgenommene Kontrolle und subjektive Norm erhoben. Zur Erhebung der allgemeinen Belastung wurde der *Global Severity Index* (GSI) des *Brief Symptom Inventory* (BSI) genutzt. Das *Big Five Inventory* (BFI; Rammstedt & Danner, 2017) kam zur Erfassung von Persönlichkeit zum Einsatz. Mit der *Kurzskala Autoritarismus* (KSA-3) wurde RWA und mit der deutschen Version der Skala von Cohrs, Moschner, Maes und Kielmann (2005) basierend auf den Skalen von Pratto et al., (1994) und Six, Wolfrath und Zick (2001) wurde

SDO gemessen . Mit der Skala von Schlotz, Yim, Zoccola, Jansen & Schulz (2011) wurde Stressreaktivität erfasst. Der Unterschied zwischen Lehramtsstudierenden, Lehrkräften und PiAs in der gemessenen und selbsteingeschätzten Einstellung zu Kindern mit ADHS wurde mittels MANOVA untersucht. Latente Profile, die Teilnehmer*innen mit einem ähnlichen Antwortmuster bzgl. der gemessenen Einstellung zu Kindern mit ADHS in Klassen subsummieren, wurden mittels latenter Profilanalyse (LPA) ermittelt. Diese basiert auf den Antworten auf den *ASE*-Subskalen *Erwartung positiver Aspekte*, *Erwartung negativer Aspekte*, *Bewertung positiver Aspekte* und *Bewertung negativer Aspekte*. Anschließend wurden Unterschiede zwischen den latenten Profilen in den potentiellen beeinflussenden Variablen mit Hilfe der so genannten BCH-Methode überprüft (Asparouhov & Muthen, 2014; Bakk, Oberski, & Vermunt, 2014).

Ergebnisse: Die MANOVA ergab einen signifikanten Unterschied zwischen Gruppen bzgl. der mit dem *ASE* gemessenen und der selbsteingeschätzten Einstellung zu Kindern mit ADHS, $F_{ASE}(2, 1768) = 4.936$, $p = .007$ bzw. $F_{Selbst}(2, 1768) = 5.678$, $p = .003$. Post-hoc Tests ergaben, dass PiAs eine signifikant positivere gemessene ($M_{ASE} = -8.84$, $SD_{ASE} = 14.45$) und signifikant negativere selbsteingeschätzte ($M_{Selbst} = -0.52$, $SD_{Selbst} = 1.65$) Einstellung zu Kindern mit ADHS aufwiesen als Lehrkräfte ($M_{ASE} = -13.12$, $SD_{ASE} = 14.66$ bzw. $M_{Selbst} = -0.03$, $SD_{Selbst} = 1.66$), $p_{ASE} = .012$ bzw. $p_{Selbst} = .008$. Die LPA wies auf drei unterschiedliche Einstellungsprofile hin, Log Likelihood = -9399.986, Akaike Information Criterion = 18835.973, Bayesian Information Criterion = 18934.833, sample size-adjusted BIC = 18877.648, *Vuong-Lo-Mendell-Rubin likelihood ratio test* = 0.002, *Lo-Mendell-Rubin likelihood ratio test of model fit* = 0.003, parametric bootstrapped LRT <.01, Entropy = 0.855. Die Unterschiede zwischen den latenten Einstellungsprofilen ergaben sich vor allem durch unterschiedliche Bewertungen der Erwartungen. Für 22 % der Teilnehmer*innen ergab sich ein negatives Bewertungsprofil durch negative Bewertungen positiver und negativer Aspekte. Ein moderates Bewertungsprofil zeigten 27 % der Teilnehmer*innen und ein extremes

Bewertungsprofil rund 52 %. Weiterhin konnten Unterschiede zwischen den latenten Profilen hinsichtlich der Variablen selbsteingeschätzte Einstellung, Wissen über ADHS, wahrgenommene Kontrolle, wahrgenommener Stress durch Kinder mit ADHS, Einsatz ineffektiver CMS, Bewertung in- und effektiver CMS, SDO, RWA, Stressreaktivität und Extraversion aufgezeigt werden.

Diskussion: Zunächst kann mit dieser Studie gezeigt werden, dass PiAs gemessen mit dem *ASE* eine positivere und in der Selbsteinschätzung eine negativere Einstellung zu Kindern mit ADHS berichteten als Lehrkräfte. Dieses Ergebnis könnte auf eine selbstkritischere oder realistischere Haltung der PiAs deuten. Gleichzeitig könnte das Ergebnis aber auch auf einen eher intra-individuellen Bezugsrahmen statt einem Vergleich mit der Gesamtpopulation auf Seiten der PiAs zurückzuführen sein. Mittels LPA können drei unterschiedliche Einstellungsprofile ermittelt werden, die auf unterschiedlichen Bewertungen von Erwartungen basierten und sich in weiteren Variablen unterschieden. Ein erstes Einstellungsprofil ist gekennzeichnet durch eine Tendenz zu negativen Bewertungen positiver und negativer Aspekte. Zudem geht es, verglichen mit den anderen Profilen, mit dem negativsten *ASE*-Einstellungswert, der niedrigsten Effektivitätsbewertung in- und effektiver CMS, dem höchsten Einsatz ineffektiver CMS, dem höchsten wahrgenommenen Stress durch Kinder mit ADHS und dem höchsten RWA-Wert einher. Das zweite Einstellungsprofil zeichnet sich durch moderate Bewertungen aus. Außerdem zeigt sich für dieses Profil im Vergleich zu den anderen die positivste Einstellung zu Kindern mit ADHS, sowohl gemessen mit dem *ASE* als auch über die Selbsteinschätzung, die meiste wahrgenommene Kontrolle, der niedrigste wahrgenommene Stress durch Kinder mit ADHS, das geringste Wissen über ADHS und die höchste Effektivitätsbewertung ineffektiver CMS. Die Kombination dieser Ergebnisse könnte auf eine eher unbeteiligte Haltung der Personen mit diesem Einstellungsprofil hindeuten, die schulischen bzw. therapeutischen Situationen und somit auch dem Verhalten von Kindern mit ADHS nicht allzu viel Bedeutung beimessen. Das letzte Einstellungsprofil wird durch eher

extreme Bewertungen charakterisiert und gewichtete positive Aspekte stärker als negative. Mit den anderen Profilen verglichen, geht es zudem mit moderat negativer Einstellung zu Kindern mit ADHS und moderat wahrgenommenem Stress durch diese, der besten Effektivitätsbewertung effektiver und der schlechtesten Effektivitätsbewertung ineffektiver CMS sowie dem niedrigsten SDO- und Extraversionswert einher. Dies könnte auf Personen mit eher realistischer Haltung hindeuten, die es bevorzugen, mit Kindern mit ADHS auf einer eher gleichberechtigten Ebene zu arbeiten, den Aufwand dieser Arbeit aber auch einzuschätzen wissen. Vorteilhaft für einige Lehrkräfte könnte das Einstellungsprofil mit moderater Bewertung sein, da es vermutlich mit wenig zusätzlichem Aufwand und dennoch mit wenig Stress durch Kinder mit ADHS einhergeht. Für Kinder mit ADHS hingegen könnte das Einstellungsprofil mit extremer Bewertung am vorteilhaftesten sein, da Fachkräfte mit diesem sich am ehesten mit einem symptomreduzierenden Umgang auseinanderzusetzen scheinen. Limitierend ist zu nennen, dass die Berufserfahrung sowie ihr Einfluss in den untersuchten Berufsgruppen sehr unterschiedlich sein kann und in zukünftigen Studien präzise eingeschlossen werden sollte. Da nur vermutet werden kann, wie sich die unterschiedlichen Einstellungsprofile auf Kinder mit ADHS auswirken, wäre die Erforschung ihrer Sichtweise von Interesse. Insgesamt zeigen die Ergebnisse dieser Studie jedoch, dass bei dem Versuch, eine positive Lernumgebung zu schaffen und effektive CMS zu implementieren, unterschiedliche Grundhaltungen innerhalb der mit Kindern mit ADHS arbeitenden Fachkräfte zu beachten sind.

3.4 Zusammenfassung Studie 4

Influences on pre-service teachers' intention to use classroom management strategies for students with ADHD: A model analysis.

Strelow, A. E., Dort, M., Schwinger, M., & Christiansen, H. (2020). Influences on pre-service teachers' intention to use classroom management strategies for students with ADHD: A model analysis. *International Journal of Educational Research*, *103*, 101627. https://doi.org/10.1016/j.ijer.2020.101627

Theoretischer Hintergrund: Wenngleich sich Schülerinnen und Schüler mit ADHS häufig unfair von Lehrkräften behandelt fühlen, berichten einige unterstützendes Verhalten (Honkasilta, Vehkakoski, & Vehmas, 2016), so dass man einen unterschiedlichen Umgang von Lehrkräften mit der Störung vermuten kann. Insgesamt scheint dieser jedoch noch nicht geprägt durch den Einsatz evidenzbasierter CMS (Gaastra et al., 2016; Ruhmland & Christiansen, 2017). Beeinflusst werden kann der Umgang mit der Störung durch generalisierte Erwartungen auf Seiten der Lehrkräfte (Ohan, Visser, Strain, & Allen, 2011). Generalisierte Erwartungen bzgl. CMS können im Rahmen verhaltensbezogener Einstellung erfasst werden (Ajzen, 2005), die, der *TPB* entsprechend, sowohl die Intention als auch darüber vermittelt den tatsächlichen Einsatz dieser CMS beeinflusst. Des Weiteren werden generalisierte Erwartungen dem *ViolEx-Modell* zufolge durch direkte Erfahrungen, soziale Einflüsse sowie individuelle Unterschiede beeinflusst. Um die bisherige Implementationslücke evidenzbasierter CMS und den unterschiedlichen Umgang von Lehrkräften mit Schülerinnen und Schülern mit ADHS besser zu verstehen, soll in dieser Studie untersucht werden, welche Variablen die Einstellung zu (in)effektiven CMS sowie die Intention, diese einzusetzen, in welchem Ausmaß beeinflussen.

Methode: Die Studie basiert auf den Daten von $N = 1086$ Lehramtsstudierenden (s. Studie 2 und 3). Erhoben wurden die Einstellung zu Schülerinnen und Schülern mit ADHS, die Einstellung zu und der Einsatz von CMS sowie als direkte Erfahrung der wahrgenommene Stress durch Schülerinnen und Schüler mit ADHS, als sozialer Einfluss die subjektive Norm und als individuelle Unterschiede Wissen, wahrgenommene Kontrolle, Belastung, Stressreaktivität und Persönlichkeit inkl. RWA und SDO (verwendete Messinstrumente s. Studie 3). Die Zusammenhänge der Variablen und die Richtung dieser Zusammenhänge sowie die Signifikanz indirekter Effekte wurden mittels Pfadmodell- und Mediationsanalysen in einem Modell für den Einsatz effektiver sowie in einem Modell für den Einsatz ineffektiver CMS überprüft.

Ergebnisse: Die Ergebnisse der Pfadmodell- und Mediationsanalysen zum Einsatz effektiver CMS werden in *Abbildung 5* und zum Einsatz ineffektiver CMS in *Abbildung 6* veranschaulicht.

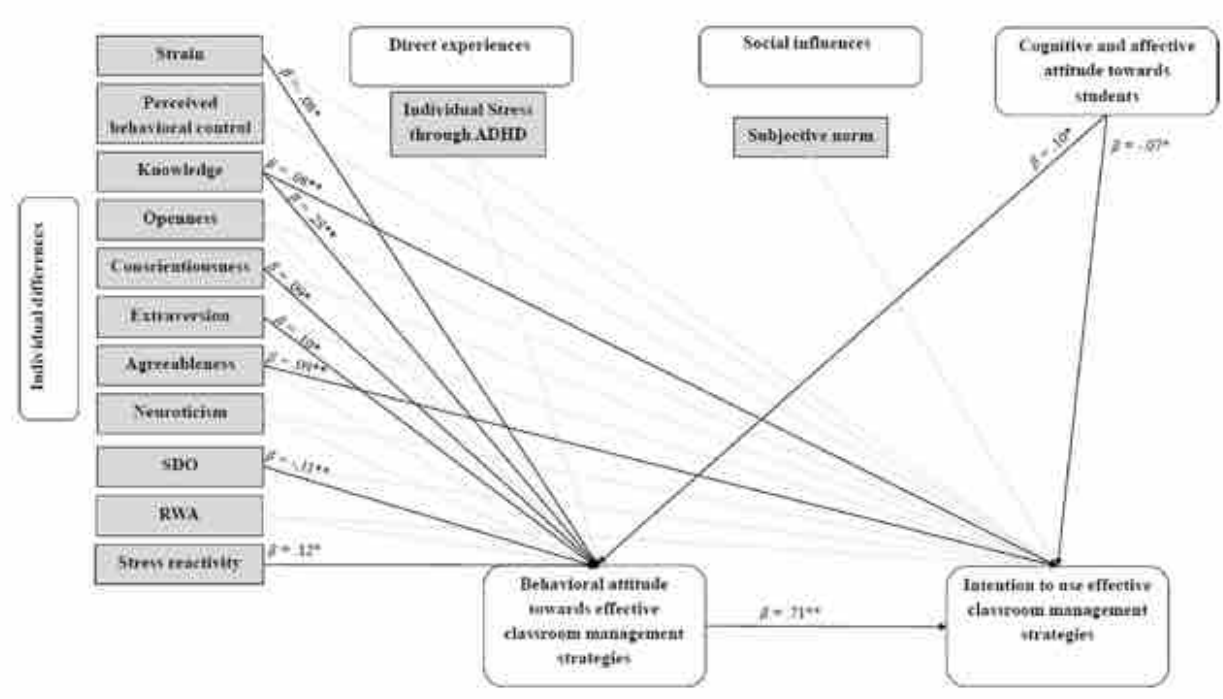

Abbildung 5. Ergebnisse der Pfadmodell- und Mediationsanalyse zum Einsatz effektiver CMS basierend auf den Daten von N = 1086 Lehramtsstudierenden. Schwarze Linien repräsentiere signifikante (* $p < .05$, ** $p < .01$) und graue Linien in die Analyse eingeschlossene aber nicht signifikante Einflüsse. Fit-Indizes des Pfadmodells: $R^2_{Intention}$ =.59**; $R^2_{verhaltensbezogene\ Einstellung}$ =.20**; Test Modellfit: $\chi^2(3)$ =6.66, p = .08; Test Baselinemodell: χ^2 (29) = 833.08, p <.01; CFI =1.00; TLI =.96; RMSEA = 0.04; SRMR = 0.01.

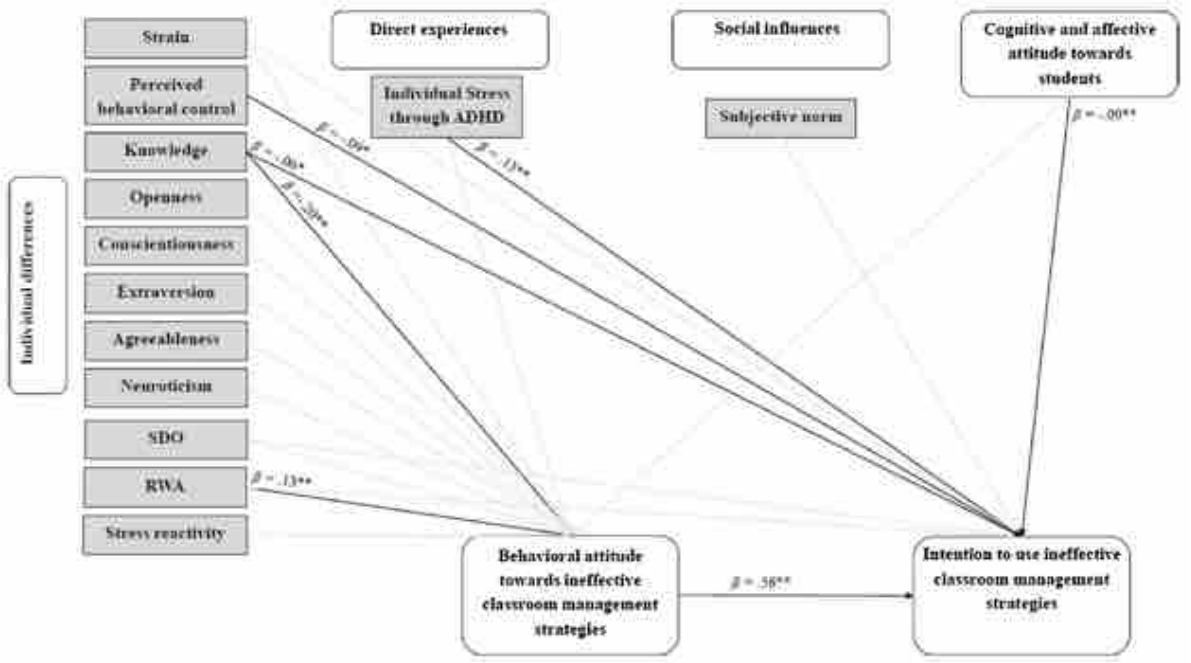

Abbildung 6. Ergebnisse der Pfadmodell- und Mediationsanalyse zum Einsatz ineffektiver CMS basierend auf den Daten von N = 1086 Lehramtsstudierenden. Schwarze Linien repräsentiere signifikante (* $p < .05$, ** $p <$ .01) und graue Linien in die Analyse eingeschlossene aber nicht signifikante Einflüsse. Fit-Indizes des Pfadmodells: $R^2_{Intention}$ =.44**; $R^2_{verhaltensbezogene\ Einstellung}$ =.10**; Test Modellfit: χ^2 (8) = 10.18, p = .25; Test Baselinemodell: χ^2 (29) = 516.21, p <.01; CFI=1.00; TLI=.98; RMSEA = 0.02; SRMR = 0.02.

Diskussion: Die getesteten Modelle bzgl. der Intention von Lehramtsstudierenden (in)effektive CMS einzusetzen, können einen großen Anteil an Varianz erklären und ergeben gute Modellfitindizes. Wahrgenommener Stress durch Schülerinnen und Schüler mit ADHS als direkte Erfahrung kommt nur im Modell bzgl. der ineffektiven CMS zum Tragen und begünstigt den Einsatz dieser. Subjektive Norm hingegen hat in keinem der Modelle signifikanten Einfluss. Des Weiteren haben alle die Einstellung zu (in)effektiven CMS beeinflussenden Variablen vermittelt über diesen Faktor auch einen indirekten Einfluss auf die Intention, (in)effektive CMS einzusetzen. Den größten Einfluss auf den Einsatz von (in)effektiven CMS hat die Einstellung zu diesen. Bezogen auf effektive CMS wird diese wiederum von der Einstellung zu Schülerinnen und Schülern mit ADHS beeinflusst. So kann eine positive Einstellung zu Schülerinnen und Schülern mit ADHS als Türöffner für den Einsatz effektiver CMS gesehen werden. Dass diese positive Einstellung zu Schülerinnen und Schülern mit ADHS den Einsatz ineffektiver und effektiver Interventionen gleichzeitig reduziert, könnte durch einen geringeren Handlungsdruck auf Seiten der Lehramtsstudierenden erklärt werden. Die allgemeine Belastung hat einen negativen Einfluss auf die Einstellung zu effektiven CMS, der sich durch niedrigeres Engagement bei höherer Belastung erklären lassen könnte (Hakanen et al., 2006). Der negative Einfluss von wahrgenommener Kontrolle auf die Intention, ineffektive CMS zu nutzen, könnte als präventiver Faktor gesehen werden. Wissen über ADHS ist ein positiver Einflussfaktor auf die Einstellung zu und den Einsatz von effektiven Interventionen und ein negativer Einflussfaktor für die Einstellung zu und den Einsatz von ineffektiven Interventionen. Der im Vergleich zur Einstellung geringere Effekt auf die Intention verdeutlicht, dass Wissen alleine für den Einsatz adäquater CMS nicht auszureichen scheint. Der positive Einfluss von Verträglichkeit auf die Intention, effektive CMS zu nutzen, ist kongruent zu DeYoungs (2015) Annahme, dass diese Persönlichkeitseigenschaft zu kooperativem und altruistischem Verhalten beiträgt. Weiterhin positiv beeinflussen Gewissenhaftigkeit, Extraversion und

Stressreaktivität die Einstellung zu effektiven CMS während SDO einen negativen Einfluss hat. Die Einstellung zu ineffektiven CMS wird zudem positiv durch RWA beeinflusst. Die Erkenntnisse dieser Studie können maßgeblich dazu beitragen, die Ausbildung von Lehrkräften zu verbessern, indem ihnen mehr Wissen über ADHS und über den Umgang damit vermittelt wird. Auch sollten sie von der Effektivität evidenzbasierter CMS sowie ihrem eigenen Können überzeugt werden. Da die Ergebnisse sich bisher nur auf Lehramtsstudierende beziehen, ist eine Untersuchung mit Lehrkräften nötig, um Aussagen über das Zutreffen des Modells auf diese Gruppe machen zu können. Auch sagt die Intention das tatsächliche Verhalten nur begrenzt vorher (Sheeran & Webb, 2016), weshalb auch dieses konkreter untersucht werden sollte. Zusammenfassend kann jedoch gesagt werden, dass insbesondere die Einstellung zu effektiven Interventionen adressiert werden sollte, um als ersten Schritt die Intention, diese einzusetzen, zu erhöhen.

3.5 Zusammenfassung Studie 5

Influences on in-service teachers' intention to use classroom management strategies for students with ADHD: A model replication analysis.

> Strelow, A. E., Dort, M., Schwinger, M., & Christiansen, H. (under review). Influences on in-service teachers' intention to use classroom management strategies for students with ADHD: A model replication analysis. *Sustainability*.

Theoretischer Hintergrund: Der Einsatz evidenzbasierter CMS ist für einen allumfassenden Behandlungsansatz für Schülerinnen und Schüler mit ADHS unabdingbar und scheint dennoch bisher nicht in den schulischen Alltag implementiert (Dupaul & Weyandt, 2006; Gaastra et al., 2016; Ruhmland & Christiansen, 2017). Die vorangegangene Modellanalyse fand anhand einer Strichprobe von Lehramtsstudierenden, dass die Einstellung zu CMS die Intention, diese einzusetzen, maßgeblich beeinflusst (Strelow, Dort, Schwinger, & Christiansen, 2020). Lehramtsstudierende verfügen jedoch über wenig bis gar keine Berufserfahrung. Da mehr direkte Erfahrung mit Schülerinnen und Schülern mit ADHS bei

Lehrkräften jedoch zu einer negativeren Reaktion auf diese einhergeht (Greene et al., 2016), ist es von Relevanz, auch diese Variable zu betrachten. Zudem unterscheiden sich Lehrkräfte auch in der Schulform, an der sie unterrichten. So variiert die Ausbildung von Grundschul- und Förderschullehrkräften von anderen Schulformen und führt zu mehr Wissen bzgl. des Einsatzes von CMS und demnach vermutlich auch zu mehr Erfahrung in diesem Bereich (Mohr-Jensen, Steen-Jensen, Bang-Schnack, & Thingvad, 2019). Weiterhin ist die Gruppe der Lehrkräfte verglichen mit Lehramtsstudierenden i.d.R. heterogener bzgl. ihrer demographischen Variablen. Aus diesen Gründen untersucht diese Modellanalyse, ob das für Lehramtsstudierende etablierte Modell zum Einsatz von CMS auf Lehrkräfte übertragen werden kann, und ob die Erweiterung dieses Modells um die demographischen Variablen Geschlecht und Alter sowie um die Variablen Berufserfahrung und Grundschul- bzw. Förderschullehrkraft zusätzliche Erkenntnisse liefert.

Methode: Die Modellanalyse basierte auf einer Stichprobe von N = 599 Lehrkräften (s. Studie 2 und 3) und verlief analog zu Studie 4.

Ergebnisse: Die Ergebnisse der Pfadmodell- und Mediationsanalysen sind in *Abbildung 7* für effektive Interventionen und in *Abbildung 8* für ineffektive Interventionen veranschaulicht.

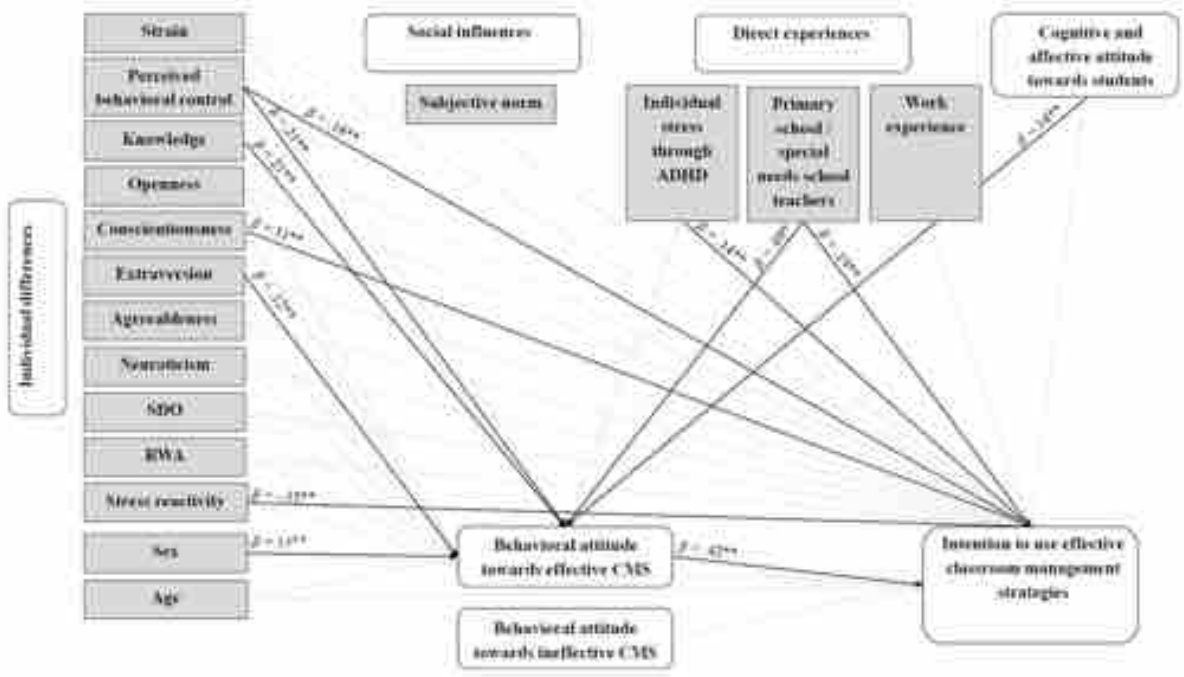

Abbildung 7. Ergebnisse der Pfadmodell- und Mediationsanalyse zum Einsatz effektiver CMS basierend auf den Daten von N = 599 Lehrkräften. Schwarze Linien repräsentiere signifikante (* $p < .05$, ** $p < .01$) und graue Linien in die Analyse eingeschlossene aber nicht signifikante Einflüsse. Fit-Indizes des Pfadmodells: $R^2_{Intention}$ =.47**; $R^2_{verhaltensbezogene\ Einstellung}$ =.24**; Test Modellfit $\chi^2(2) = 1.13$, $p = .57$; Test Baselinemodell: $\chi^2(1) = 458.81$, p <.01.; CFI = 1.00; TLI = 1.00; RMSEA = 0.00; SRMR = 0.01.

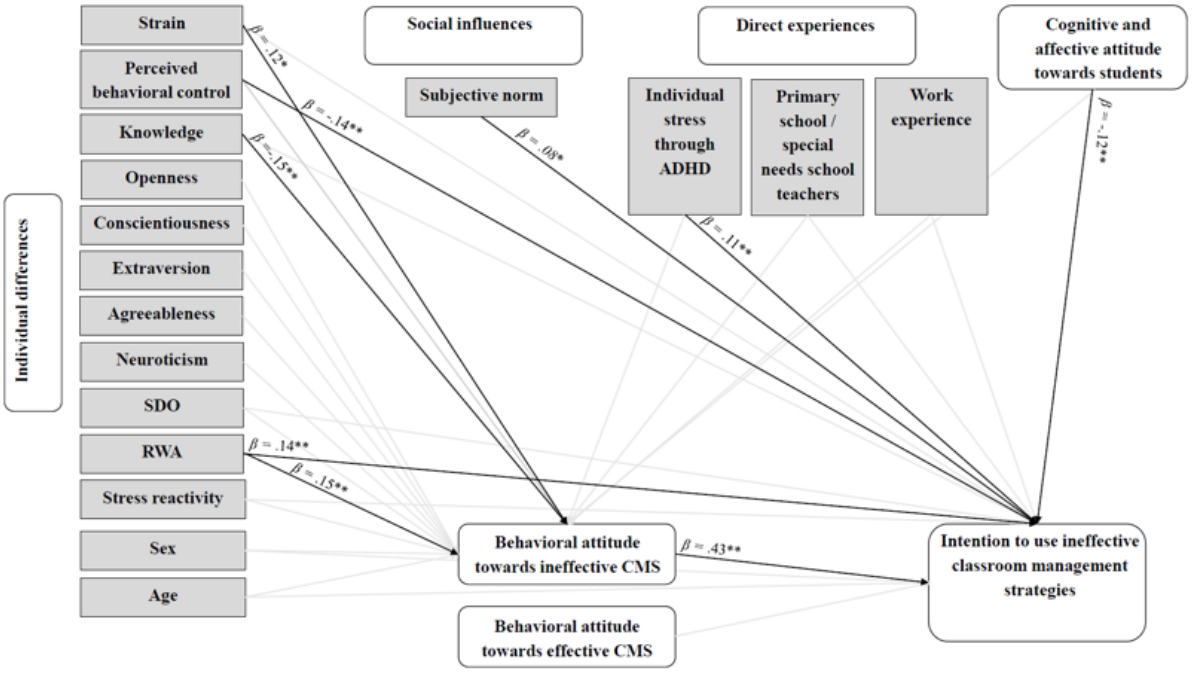

Abbildung 8. Ergebnisse der Pfadmodell- und Mediationsanalyse zum Einsatz ineffektiver CMS basierend auf den Daten von N = 599 Lehrkräften. Schwarze Linien repräsentiere signifikante (* $p < .05$, ** $p < .01$) und graue Linien in die Analyse eingeschlossene aber nicht signifikante Einflüsse. Fit-Indizes des Pfadmodells: $R^2_{Intention}$ =.39**; $R^2_{verhaltensbezogene\ Einstellung}$ =.10**; Test Modellfit: $\chi^2(7) = 2.16$, $p = .95$; Test Baselinemodell: $\chi^2(39) = 300.89$, p <.01.; CFI = 1.00; TLI = 1.00; RMSEA = 0.00; SRMR = 0.01.

Diskussion: Die aus der Studie mit Lehramtsstudierenden hervorgegangenen Modelle lassen sich anhand der Lehrkraftstichprobe nur bezogen auf ineffektive CMS replizieren. Jedoch ergeben sich durch die Erweiterung der Modelle um die Variablen Geschlecht, Alter sowie Berufserfahrung und Grundschul- bzw. Förderschullehrkraft gute Fit-Indizes. Alle Variablen, die auf die Einstellung zu (in)effektiven CMS wirken, beeinflussten, vermittelt über die Einstellung zu (in)effektiven CMS, auch die Intention, die (in)effektiven CMS einzusetzen. Dieses Ergebnis entspricht dem Ergebnis der Modellanalysen für die Daten von Lehramtsstudierenden. Wie auch in der vorangegangenen Studie und kongruent mit der *TPB* ist die Einstellung zu (in)effektiven CMS der größte Einflussfaktor auf die Intention, diese einzusetzen. Berufserfahrung gemessen in Berufsjahren scheint hingegen keinen Einfluss auf

die Einstellung zu und den Einsatz von (in)effektiven CMS zu haben. Für Lehrkräfte zeigt sich wie auch schon für Lehramtsstudierende, dass die Einstellung zu Schülerinnen und Schülern mit ADHS die Einstellung zu effektiven CMS positiv beeinflusst. Anders als bei Lehramtsstudierenden hat der wahrgenommene Stress durch Schülerinnen und Schüler mit ADHS einen positiven Einfluss auf die Intention CMS allgemein einzusetzen. Stressreaktivität hatte einen negativen Einfluss auf die Intention effektive CMS einzusetzen und die allgemeine Belastung einen positiven Einfluss auf die Einstellung zu ineffektiven CMS. Diese Ergebnisse deuten darauf hin, dass ein gewisses Ausmaß an Stress günstig für das Erleben von Handlungsdruck und dem generellen Einsatz von CMS ist. Ein zu hohes Maß an Anfälligkeit für Stress scheint jedoch ungünstig für den Einsatz effektiver CMS und eine hohe allgemeine Belastung scheint sogar die positive Einstellung zu ineffektiven CMS zu fördern. Das Unterrichten an Grund- oder Förderschulen beeinflusst die Intention, effektive CMS zu nutzen, ebenfalls positiv, wobei diese Variable zusätzlich auch die Einstellung zu effektiven CMS positiv beeinflusst. Gleiches gilt auch für wahrgenommene Kontrolle. Dadurch ergibt sich, dass sowohl Grund- und Förderschullehrkräfte als auch Lehrkräfte mit hoher wahrgenommener Kontrolle, möglicherweise durch mehr Wissen und Erfahrung im Umgang mit Schülerinnen und Schülern mit ADHS, effektive CMS eher favorisieren als andere Lehrkräfte. Des Weiteren wird die Einstellung zu effektiven CMS durch Wissen, Gewissenhaftigkeit und Extraversion sowie das weibliche Geschlecht der Lehrkraft positiv beeinflusst. Die Intention, ineffektive CMS einzusetzen, wird u.a. durch die Einstellung zu Schülerinnen und Schülern mit ADHS negativ und die subjektive Norm positiv beeinflusst. Dies könnte dadurch erklärt werden, dass die positive Einstellung von Kollegen und Vorgesetzten zu Schülerinnen und Schülern mit ADHS zwar Handlungsbedarf erzeugt, aber bei fehlender eigener positiver Einstellung zu diesen Schülerinnen und Schülern die Auseinandersetzung mit dem Thema und somit das Wissen über adäquate Strategien möglicherweise fehlt. Wissen beeinflusst die Einstellung zu ineffektiven CMS negativ.

Wahrgenommene Kontrolle beeinflusst zudem die Intention, diese zu nutzen, negativ. Insgesamt unterstützen die Ergebnisse insbesondere im Hinblick auf die Unterschiede zwischen Lehrkräften unterschiedlicher Schulformen, dass die Ausbildung hinsichtlich des Umgangs mit herausfordernden Verhaltensweisen optimiert werden sollte. Auch sollte der Umgang mit und die Reduktion von Stress und Belastung auf ein durchschnittliches bis maximal leicht überdurchschnittliches Maß bei höherer Anforderung trainiert werden. Wenngleich das tatsächliche Verhalten von Lehrkräften noch zu erforschen bleibt, unterstreicht diese Studie die Relevanz der Einstellung von Lehrkräften. Auch zeigt diese Studie, dass Wissen über ADHS und wahrgenommene Kontrolle, als verhältnismäßig gut beeinflussbare Variablen, die Reduktion des Einsatzes ineffektiver und die Förderung des Einsatzes effektiver CMS für Schülerinnen und Schüler mit ADHS unterstützen können.

4 Diskussion

Ziel der vorliegenden Dissertation ist es, mögliche Gründe für die bisher fehlende Implementation evidenzbasierter CMS für Schülerinnen und Schüler mit ADHS in den schulischen Alltag aufzuzeigen. Weiterhin soll der Einfluss der Einstellung von Lehrkräften in diesem Zusammenhang beleuchtet werden.

4.1 Übersicht über die Studienergebnisse

Die **erste Studie** untersucht den Austausch wissenschaftlicher Erkenntnisse der Forschungsbereiche Psychologie/Psychiatrie und Pädagogik bzgl. CMS für Schülerinnen und Schüler mit ADHS mittels bibliometrischer Analysen der wissenschaftlichen Literatur. Es wird deutlich, dass der Großteil der Forschung zu dieser Thematik bisher im Forschungsbereich Psychologie/Psychiatrie vorangetrieben wurde. Allerdings fehlt dabei eine lehrkraftzentrierte Sichtweise, die sich lediglich in Literatur des Forschungsbereichs Pädagogik wiederfindet. Auch kann diese Studie zeigen, dass Implementationsmethoden und

potentielle –barrieren bisher in keinem der untersuchten Forschungsbereiche einen Forschungsschwerpunkt darzustellen scheint. Wenn Forschung in dem weniger lehrkraftnahen Forschungsbereich Psychologie/Psychiatrie betrieben wird, die Lehrkraftsicht sowie Implementationsmöglichkeiten dabei jedoch vernachlässigt werden und kein ausreichender Austausch mit dem lehrkraftnäheren Forschungsbereich Pädagogik stattfindet, ist es nicht verwunderlich, dass die Erkenntnisse die schulische Praxis nicht erreichen, wie sich in vorherigen Studien zeigt (Ruhmland & Christiansen, 2017).

Mit Hilfe der **zweiten Studie** wird der *ASE* als neues theoriebasiertes Messinstrument zur Erfassung von Wissen über ADHS, Einstellung zu Schülerinnen und Schülern mit ADHS sowie Einstellung zu und Einsatz von CMS für Schülerinnen und Schüler mit ADHS eingeführt. Dabei kann im Rahmen der Studie die inhaltliche Validität sowie Reliabilität des *ASE* gezeigt werden. So kann dieser nun für den in Studie 1 deutlich gewordenen Forschungsbedarf bzgl. der Implementation von CMS für Schülerinnen und Schüler mit ADHS eingesetzt werden.

Die **dritte Studie** basiert auf dem *ASE* und vergleicht die Einstellung von Lehramtsstudierenden, Lehrkräften und PiAs miteinander. Diese Analyse ergibt eine positivere Einstellung gemessen mit dem *ASE* und gleichzeitig eine negativere Selbsteinschätzung von PiAs verglichen mit Lehrkräften. Zudem werden in dieser Studie drei latente Einstellungsprofile identifiziert, die sich maßgeblich in der allgemeinen Bewertung erwarteter Verhaltensweisen und Eigenschaften von Schülerinnen und Schülern mit ADHS unterscheiden. Auf Basis der Unterschiede dieser Profile in weiteren Variablen kann herausgearbeitet werden, dass ein Einstellungsprofil mit moderater Bewertung mit einer eher unbeteiligten Haltung einhergeht, die insbesondere für manche Lehrkräfte vorteilhaft sein kann. Bezogen auf die Reduktion von Symptomen von Schülerinnen und Schülern mit ADHS scheint eher ein mit extremen Bewertungen verbundenes Einstellungsprofil, das auf Engagement und Auseinandersetzung mit der Thematik hinweist, von Vorteil. Ein

Einstellungsprofil mit der Tendenz zu negativen Bewertungen scheint für alle Beteiligten ungünstig.

In der **vierten Studie** werden die Zusammenhänge der in Studie 3 untersuchten Variablen mittels Pfadmodell- und Mediationsanalysen auf Basis des *ViolEx-Modells* und der *TPB* anhand einer Stichprobe von Lehramtsstudierenden überprüft. Anschließend werden die ermittelten Modelle in der **fünften Studie** anhand einer Stichprobe von Lehrkräften repliziert bzw. erweitert. Insgesamt können diese beiden Studien darlegen, dass die Einstellung zu (in)effektiven CMS den Einsatz dieser kongruent mit der *TPB* am besten vorhersagt. Auch wird deutlich, dass bzgl. des Einsatzes ineffektiver und effektiver CMS unterschiedliche Variablen in unterschiedlichem Ausmaß zum Tragen kommen. Um den Einsatz effektiver CMS zu fördern, sind die Einstellung zu Schülerinnen und Schülern mit ADHS, Wissen über die Störung und den Umgang damit, wahrgenommene Kontrolle sowie Stress beeinflussbare, relevante Einflüsse. Damit sind die Ergebnisse nicht nur bezogen auf die *TPB* und das *ViolEx-Modell* theoriekonform, sondern untermauern auch erste vorangegangene Studienergebnisse zu vereinzelten Zusammenhängen von Variablen wie Einstellung und Wissen oder Interventionseinsatz (Lee & Witruk, 2016a; Lübke et al., 2016; Ohan et al., 2008).

Zusammenfassend lässt sich sagen, dass die vorliegende Dissertation eine Forschungslücke im Bereich der Implementation von evidenzbasierten CMS für Schülerinnen und Schüler mit ADHS nachweisen kann, die sich in die allgemein beobachtbare Lücke zwischen Wissenschaft und Praxis im Bildungsbereich einreiht (Schrader, Hasselhorn, Hetfleisch, & Goeze, 2020). Darüber hinaus unterstützt diese Arbeit das Schließen dieser Lücke, indem sie ein valides und reliables Messinstrument sowie erste Erkenntnisse zu Einflussfaktoren auf den Einsatz von CMS darlegt. Insbesondere die Relevanz von Einstellung zu CMS aber auch zu Schülerinnen und Schülern mit ADHS wird durch die Studien im Rahmen dieser Dissertation deutlich.

4.2 Praktische Implikationen

Aus den Ergebnissen der Studien dieser Dissertation ergibt sich, dass im Bereich der Implementation von CMS für Schülerinnen und Schüler mit ADHS nicht nur noch Forschungsbedarf besteht, sondern auch, dass die Integration von Erkenntnissen unterschiedlicher Forschungsbereiche von großer Bedeutung ist. Deshalb sollte interdisziplinäres Arbeiten in diesem Bereich gestärkt werden.

Weiterhin wird deutlich, dass sich unterschiedliche Einstellungsprofile auch in der Auseinandersetzung mit der Thematik zu unterscheiden scheinen. Daraus ergibt sich, dass bei der Implementation von CMS eventuell unterschiedliche Herangehensweisen notwendig sind, um alle Lehrkräfte vom Einsatz dieser zu überzeugen.

Das Ergebnis, dass sich Lehrkräfte an Grund- und Förderschulen im Hinblick auf die Bewertung von CMS und die Intention, diese einzusetzen, von Lehrkräften an anderen Schulformen unterscheiden, deutet daraufhin, dass die Ausbildung der Lehrkräfte einen Beitrag zum adäquaten Umgang mit ADHS leisten kann. Deshalb sollte der Umgang mit herausforderndem Verhalten von Schülerinnen und Schülern im Lehramtsstudium und Referendariat zukünftig mehr Berücksichtigung finden. Außerdem sollte es entsprechende Schulungen und/oder Supervisionsangebote für Lehrkräfte geben, die bereits praktisch tätig sind. Eine forschungsrelevante Frage wäre diesbezüglich, welche Erwartungen Lehrkräfte an Schulungs- und Supervisionsangebote bzgl. des Formats, der durchführenden Person o.ä. haben.

Weiterhin scheinen Schulungsangebote zur Vermittlung eines adäquaten und hilfreichen Umgangs mit Stress für Lehrkräfte sinnvoll, da die vorliegende Dissertation den Einfluss dieses Faktors auf die Einstellung zu CMS und die Intention, diese einzusetzen, verdeutlicht. Gleichzeitig könnte dem Job-Demand-Resources Modell für Lehrkräfte entsprechend (Hakanen et al., 2006) auch das latente Einstellungsprofil mit negativer Bewertungstendenz, das ebenfalls mit einer unvorteilhaften Haltung bzgl. CMS einhergeht,

auf Stress zurückzuführen sein. Durch Strategien zur Stressreduktion könnte die Erschöpfung der Lehrkräfte reduziert und darüber ihr Engagement effektive CMS auszuprobieren erhöht werden. Letzteres wiederum wäre hilfreich um den Anforderungen, die Verhaltensauffälligkeiten von Schülerinnen und Schülern mit ADHS mit sich bringen, adäquat zu begegnen und somit langfristig die eigene Belastung zu reduzieren.

Auf Basis der Erkenntnisse dieser Dissertation zur Einstellung und darin enthaltenen Erwartungen von Lehrkräften kann im Folgenden auch der im *ViolEx-Modell* enthaltene Bereich zu Erwartungsverletzungen in diesem Kontext untersucht werden. Mit Hilfe bereits angebahnter Experimente im Virtual-Reality-Labor (VR-Labor) kann überprüft werden, wie Lehrkräfte handeln, wenn sich Schülerinnen und Schüler mit ADHS erwartungskonform oder erwartungsverletzend verhalten. Durch die Nutzung des *ASEs* kann zudem analysiert werden, wie sehr das tatsächliche Verhalten der Lehrkraft im VR-Labor ihrer eigenen erwarteten und im Fragebogen berichteten Verhaltensintention entspricht. Des Weiteren kann auf diese Weise untersucht werden, wie Lehrkräfte im Sinne des *ViolEx-Modell* mit Erwartungsverletzungen umgehen. Sofern es zu einer Veränderung der Erwartungen kommt, wäre es auf Grund der Ergebnisse der vorliegenden Arbeit interessant zu erforschen, ob diese Veränderung sich auch auf die Bewertung der (nicht) erwarteten Aspekte sowie die Einstellung insgesamt auswirkt. Auch die letztliche Auswirkung von Erwartungsverletzungen auf den Einsatz von effektiven CMS sollte geprüft werden.

4.3 Vorzüge der Dissertation

Bei Betrachtung der vorliegenden Dissertation ist zunächst das theoriebasierte Vorgehen hervorzuheben. Bereits bei der Planung erster Studien und der Suche nach geeigneten Messinstrumenten zur Erhebung von Einstellung wurde sich mit der theoretischen Definition dieser Variablen auseinandergesetzt. Diese Auseinandersetzung verdeutlichte, dass

vorab existierende Messinstrumente für die Variable keine theoretische Herleitung liefern, sodass der *ASE* entwickelt und validiert wurde.

Des Weiteren ist bzgl. des theoriebasierten Vorgehens zu nennen, dass die Studien 2 bis 4 alle auf der *TPB* sowie dem *ViolEx-Modell* basieren. Die Ergebnisse dieser Studien weisen darauf hin, dass die allgemein formulierte *TPB* auch im spezifischen Kontext von *ADHS im Klassenzimmer* Gültigkeit hat. Außerdem prüfen die Studien den ersten Bereich des im Graduiertenkolleg *Beibehaltung vs. Veränderung von Erwartungen im Kontext von Erwartungsverletzungen* aufgestellten *ViolEx-Modells* und zeigen, dass auch dieses Modell valide auf das Thema *ADHS im Klassenzimmer* angewandt werden kann. Da das *ViolEx-Modell* der Überprüfung in der vorliegenden Arbeit standhalten konnte, kann nun vermutet werden, dass dies auch für den Bereich der Erwartungsverletzung der Fall ist. Daraus lässt sich ableiten, dass die Arbeit mit Erwartungsverletzungen eine Möglichkeit zur Veränderung der Einstellung von Lehrkräften darstellen könnte. Diese Veränderung wiederum könnte die Implementation von effektiven CMS fördern. Insgesamt bildet die vorliegende Arbeit somit die Grundlage zur weiteren Erforschung des *ViolEx-Modells* innerhalb dieses Forschungsthemas.

Ein weiterer Vorzug der vorliegenden Arbeit ist das interdisziplinäre Vorgehen. Die Arbeit zeichnet sich durch die Kooperation mit internationalen Experten aus. Diese stammen auf wissenschaftlicher Ebene einerseits aus den Bereichen klinische, pädagogische und Sozialpsychologie und andererseits aus den Forschungsmethodenbereichen zum Wissenschafts-Praxis-Transfer und *Open Innovation in Science*. Außerdem wurde auf der Ebene der Praxis-Experten mit Lehrkräften, Lehramtsstudierenden sowie Schulpsycholg*innen kooperiert. So führen auch die Studien der vorliegenden Arbeit nicht nur unterschiedliche Modelle mit Erklärungspotential zusammen, sondern integrieren sowohl klinische als auch pädagogische und sozialpsychologische Aspekte.

Des Weiteren basieren die Analysen auf großen Datensätzen, die mit online-Umfragen innerhalb eines überschaubaren Zeitraums bundesweit erhoben werden konnten. Diese Grundlage erhöht die Generalisierbarkeit der Ergebnisse.

Auch ist die Komplexität der Analysen zu betonen, da versucht wurde, nicht nur einzelne Variablenzusammenhänge, sondern ein erschöpfendes Modell zum Einsatz von CMS zu ergründen.

Abschließend ist als formaler Aspekt zu nennen, dass die vorliegende Arbeit ebenso wie das Graduiertenkolleg als solches die *Open Science Policy* und damit die fortlaufende Optimierung der Qualität wissenschaftlichen Arbeitens unterstützen. Dementsprechend wurden auch alle dieser Arbeit zugrundeliegenden Studien im Open Access Format publiziert.

4.4 Limitationen

Die dieser Dissertation zugrundeliegenden Studien basieren auf online-Umfragen, wodurch lediglich die Intention zum Einsatz von CMS erhoben werden kann. Sheeran und Webb (2016) erläutern jedoch, dass auch zwischen Intention und Verhalten eine Lücke zu beobachten ist. Ferner führt Ajzen an, dass vorangegangenes Verhalten zu Verzerrungen führen kann, die die Vorhersagewahrscheinlichkeit zukünftigen Verhaltens reduzieren können (Ajzen, 2005; Ajzen & Fishbein, 1977; Ajzen, Joyce, Sheikh, & Cote, 2011). Aus diesen Gründen sollten zukünftige Forschungsansätze die objektive Erfassung tatsächlichen Verhaltens integrieren. Erste Schritte in diese Richtung können bereits mit den in Aussicht gestellten Experimenten im VR-Labor gegangen werden.

Außerdem können die Angaben dieser Dissertation ebenso wie die vorangegangener Studien zur Einstellung von Lehrkräften zu Schülerinnen und Schülern mit ADHS nur begrenzt interpretiert werden, da Vergleichswerte fehlen. Bisher ist, nach aktuellem Wissensstand, weder empirisch dargelegt, ob sich die Einstellung zu Schülerinnen und Schülern mit ADHS tatsächlich von der zu anderen Schülerinnen und Schülern unterscheidet,

noch, falls dem so ist, wie groß die Diskrepanz dieser Einstellungswerte ist. Auch ist unklar, inwiefern die Erwartungen an Schülerinnen und Schüler mit ADHS von dem durch Lehrkräfte präferierten Verhalten von Schülerinnen und Schülern abweicht. Eine entsprechende Studie, die diese Limitationen adressiert, läuft bereits.

Nachdem die Relevanz zum Einbezug der Lehrkräfte für die Implementation von CMS betont wurde, ist anzumerken, dass auch die vorliegende Arbeit Lehrkräfte nur begrenzt involviert hat. Zwar wurden bei der Erstellung der Umfragen und bei der Erarbeitung von Forschungsideen sowie der Reflexion von Forschungsergebnissen Lehrkräfte einbezogen, gemessen am Gesamtumfang der Arbeit war der Einbezug jedoch eher gering. Daher lässt sich nicht ausschließen, dass vor allem die Interpretation der Studienergebnisse durch eine psychologische Sichtweise gefärbt ist.

5 Fazit

Abschließend lässt sich sagen, dass die vorliegende Dissertation einen wichtigen Beitrag in der Erforschung der Implementationslücke evidenzbasierter CMS für Schülerinnen und Schüler mit ADHS leistet. Sie zeigt den Bedarf weiterer interdisziplinärer Forschung auf und weist auf Potential in der Ausbildung und Schulung von Lehramtsstudierenden und Lehrkräften hin. Auch verdeutlicht diese Arbeit die Relevanz von Einstellung zu Schülerinnen und Schülern mit ADHS sowie zu entsprechenden CMS.

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7 Anhang

7.1 Studie 1

sustainability

MDPI

Review

Bibliometric Review: Classroom Management in ADHD—Is There a Communication Gap Concerning Knowledge Between the Scientific Fields Psychiatry/Psychology and Education?

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Abstract: Many students with ADHD experience educational attainment difficulties. Nevertheless, evidence-based classroom management strategies (CMS) are seldom used. This science–practitioner gap might be due to a lack of shared knowledge between the scientific fields of psychology/psychiatry and education. This review uses science mapping to explore the basis of the current stock of knowledge in each of the two scientific fields, compares current approaches, and examines whether implementation methods and related barriers are investigated topics. We conducted a systematic search of the literature to identify articles on CMS in ADHD. We then conducted co-citation analyses and bibliographic coupling analysis. The former revealed six clusters of psychology/psychiatry and five clusters of education. Bibliographic coupling analysis resulted in eight clusters, with literature from both fields. The majority of the research is conducted in the field of psychology/psychiatry; teachers' perspectives are focused only in the field of education. The number of studies on implementation and potential barriers is small. There was thus relatively little communication between the sciences, but the scientific fields have seemed to converge recently. Connecting the scientific fields more and concentrating on implementation methods and barriers is strongly needed to close the science–practitioner gap.

Keywords: ADHD; classroom management strategies; bibliometric review; communication gap; psychology/psychiatry; education

1. Introduction

About 5–7% of all students all over the world suffer from attention deficit/hyperactivity disorder (ADHD), meaning that approximately one in 20 students shows symptoms of inattention, hyperactivity, and impulsivity [1–3]. Those three ADHD core symptoms are visible in students' problematic classroom behavior, e.g., difficulty focusing attention, distractibility, lack of impulse control, losing things, and forgetfulness [4]. This is connoted to a high variety of educational problems in school, like poor

performances in math, spelling, and reading, higher rates of repeating a school year, suspensions, and school exclusions [5,6]. About 50–80% of students with ADHD show at least one educational learning or achievement problem and those problems are seen as the mediator between symptoms of ADHD and increased risk of delinquency in the future [7]. Consequently, there is a need for treatment that reduces the symptoms of ADHD and decreases the risk of educational problems and concomitant difficulties.

Previous research indicates that the symptoms of ADHD are managed effectively with medication, (cognitive) behavioral therapy, and a combination of both [8,9]. Both treatments show significant effects on the symptoms of ADHD but often fail to improve academic achievement [9]. Effective classroom management strategies (CMS) supporting students with ADHD and offering teachers tools to decrease the impact of ADHD symptoms are therefore an important aspect of treatment [10].

Currently, teachers might use two kinds of behavioral strategies [11]: (1) antecedent-based strategies, such as modifying task-assignment or the definition of classroom rules; (2) consequent-based strategies, such as using quiet reprimands and token reinforcement [11,12]. The self-regulation or self-management approach is a special form of consequent-based CMS that uses contingency management to improve the student's ability to compare his/her own behavior to an external standard regarding this behavior. Thereby, the student learns to monitor and control their own behavior, for example by checking the task a second time [11,13].

A meta-analytic review shows that the most effective CMS are consequent-based strategies, such as using quiet reprimands and token reinforcement [11], or self-regulation strategies depending on the study designs that were used [12]. Those strategies show impressive effect sizes in decreasing off-task and disruptive behavior in children with symptoms of ADHD and further increasing the behavior of the classmates as well [12]. However, the strong association between effect- and sample size of the analyzed studies and the absence of control groups in most studies suggests that the generalizability of the large effect sizes is uncertain.

Despite the evidence supporting consequent-based strategies, teachers often use antecedent-based strategies [14]. Support for this assumption comes from studies where teachers reported that they primarily use corrective behavioral strategies and only seldom other kinds of behavioral or self-management strategies [14–16]. Overall, at least one of three students with ADHD does not receive any support in the classroom in the form of CMS, and this number is even higher for older students as well as for girls [17]. Whereas primary school teachers declare to apply more strategies when teaching children with ADHD, secondary school teachers do not [18], indicating that older students with ADHD do not receive sufficient support in the form of CMS. This suggests that the potential of CMS to enhance academic attainment in ADHD is not being met, partly due to teachers using strategies that are less effective for ADHD and a lack of application of these strategies to older students with ADHD. There is thus a science–practitioner gap entailing that evidenced CMS are not used best in daily school life and are often not used for older students with ADHD.

A possible reason for this science–practitioner gap might be a lack of communication between the scientific fields of psychology/psychiatry and education, which in return has led to a lack of information regarding effective CMS techniques to educational practitioners (e.g., teachers, school counsellors) about how to effectively deal with children with ADHD. Perhaps the two scientific fields focus on different aspects of handling and treating ADHD and fail to integrate their findings. This review thus aims to investigate the exchange of knowledge between the scientific fields of psychology/psychiatry and education. Furthermore, the aims of the current review are to quantitatively assess the basis of the current stock of knowledge in each of the two scientific fields and to compare these findings as well as the current approaches in those two scientific fields. Additionally, this review aims to find out if implementation methods and related barriers are investigated topics in either scientific field. This is important because even where there is good scientific and applied knowledge of CMS for ADHD, still there may be barriers to implementing these strategies; it is therefore useful to know whether this is recognized and explored in either scientific field [17].

To achieve these aims we conducted a bibliometric review using a specific approach, science mapping, which is defined as a quantitative method to statistically analyze patterns that emerge in the publication, citation and use of literature [19]. Science mapping is one of the main uses of bibliometric reviews [20]. It concentrates on the flow of information in science or in other words the structure of internal science communication. Hence, it allows us to synthesize previous research by classifying literature meta-data (e.g., authors, citations, documents, keywords) into different clusters, to visualize them with maps, and to identify links in the literature. When this meta-data is analyzed, a pattern of the most predominant literature in a field (the intellectual knowledge) can be revealed [20,21]. A bibliometric review is therefore better suited to the aims of the current research than other review methods such as systematic reviews or meta-analyses, as it handles a big set of data and provides a context of previous or following literature.

We conducted a bibliometric review to address the following hypotheses:

1. The scientific fields of psychology/psychiatry and education hold different intellectual knowledge regarding the usage of CMS for ADHD.
2. There is a communication gap between the scientific fields of psychology/psychiatry and education in the current literature concerning the exchange of knowledge.
3. Literature across both fields fails to focus on how to implement CMS in schools, how to support the teachers, or how to overcome possible barriers when implementing the CMS.

2. Materials and Methods

2.1. Literature Search

We used The Social Sciences Citation Index®(SSCI), offered by *Web of Science* for data collection as it is the most popular database in the analyzed scientific fields. It is interdisciplinary, and offers all the meta-data (title, author, abstract, key words, references, journal, year) of the literature that is relevant for a bibliometric analysis. As usual for a bibliometric review, our search was limited to one database [20]. The database SSCI was searched in November 2019 with the Boolean operators presented in Table 1. The search terms were based on the comprehensive meta-analysis by Gaastra, Groen, Tucha, & Tucha [12], which included general currently relevant terms in the context of ADHD research. Additionally, important key words in the literature about CMS for students with ADHD were supplemented.

The search resulted in $N = 422$ results in the scientific field of psychology/psychiatry and $N = 143$ results in the scientific field of education with an overlap of 40 articles (7%) in a time period from 1900 to 2019. We only included the following document types: articles, book chapters, early access articles, and reviews. Thus, twelve results (3%) in the scientific field of psychology/psychiatry and thirteen (9%) in the scientific field of education were excluded due to representing different document types (e.g. meeting abstracts or letters). For the time period of 2015 to 2019 we identified $N = 151$ articles in the scientific field of psychology/psychiatry and $N = 76$ articles in the scientific field of education with an overlap of eleven studies (5%). The non-overlapping results were reduced from $N = 216$ to $N = 202$ after applying inclusion criteria.

Table 1. Boolean operator for the literature search on CMS and ADHD.

Terms for ADHD			Terms for CMS			Terms for Scientific fields			Term for Time Span *
TS = ("ADHD") ("AD/HD") ("attention deficit") ("hyperactive" *) ("hyperkine" *) ("externali" *)	OR OR OR OR OR	AND	TS = ("antecedent-based") ("antecedent based") ("consequen *-based") ("consequen *-based") ("self-management") ("self-management")	OR OR OR OR OR OR	AND	SU = (Psychology) (Psychiatry) respectively	OR	AND	PY = (2015–2019)
			("school ("classroom ("education * ("academic * ("teacher *	Intervent *") Manage *") train*") + strateg*") treat*") program") therapy")	OR OR OR OR OR OR	SU = (Education & Educational Research)			

Note: The combination of the terms for CMS marked with a "+" were permuted. * The term for the time span was only used to filter the current literature for the bibliographic coupling analysis.

2.2. Bibliometric Methods

As we mentioned above, we used science mapping for this bibliometric review. More precisely, we used co-citation analysis to investigate the first and bibliographic coupling analysis to investigate the second and third hypothesis.

2.2.1. Co-citation Analysis

To assess the basis of the current stock of knowledge about CMS for pupils with ADHD in the scientific fields of psychology/psychiatry and education, document co-citation analysis was used. This method is based on the assumption that the more frequently two documents are cited together, the more equal their primary topic. Therefore, it analyzes how often documents appear together in reference lists [22]. In this way, this method is suitable to detect the most important literature ("the intellectual knowledge") of fields [23,24]. To figure out whether the scientific fields of psychology/psychiatry and education hold different stocks of knowledge, we conducted a separate co-citation analysis for each of the fields and compared the findings. The differentiation between those fields relies on WOS' classification.

As it takes some time until literature is cited a few times and this could lead to a bias towards older publications, this method does not necessarily reflect the currently most important articles in a field. Therefore, bibliometric coupling is a good supplement to this method [24].

2.2.2. Bibliographic Coupling

To investigate the exchange of knowledge of the current approaches in the two scientific fields of psychology/psychiatry and education, bibliographic coupling was used. In contrast to co-citation analysis, this method analyzes how often two documents cite the same reference and thus indicates how similar these documents are [20,25]. This method can only be applied to literature within a five-year time period, as, over time, the similarity of reference lists changes when newer studies are available that can only be included by newer papers [23]. We conducted a bibliographic coupling analysis with the literature of both fields combined to examine whether this literature forms rather topic- or scientific field-related clusters.

The findings of the bibliographic coupling analysis were also examined to determine whether implementation methods and related barriers are investigated topics in either field.

2.3. Data Cleaning and Analyzing

Data was first explored with the package *biblioshiny* for *RStudio Version 1.2.5019*. *Microsoft Excel 2016* was then used to identify different spellings of, e.g., author names. These alternate spellings were then used to create a thesaurus to merge duplicates for data cleaning. The data was then examined based on the described bibliometric methods. We applied network analysis to the data (for better traceability, see Figures 3 and 4). In this method, units of measurement (cited) documents are represented by network nodes, and the connections between them are represented by network ties [20]. For the co-citation analyses, network ties represent the frequency of co-occurrence of two documents in a reference list, and for bibliographic coupling analysis, network ties represent the number of equally cited references of two documents.

VOSviewer 1.6.13 was used for the network analyses [26,27]. It executes mapping, which represents positioning of the analyzed documents according to the strength of their relationship, and clustering, which represents the subsumption of similar documents simultaneously, and combines the visualization of the results in one map. The VOS mapping technique is closely related to the multidimensional scaling, which reveals a map in a low-dimensional space by placing more similar nodes closer to each other [20,27]. Clustering is carried out according to a weighted and parameterized variant of the modularity function that again represents an algorithm introduced by Newman and Girvan (2004) [27].

The results produced by *VOSviewer* were imported into *Gephi 0.9.2* to calculate the eigenvalue centrality of the nodes. This measure calculates centrality according to the number of a node's connections and their connections [28]. It was used to identify the most relevant documents and, ultimately, the main topics for each cluster.

Finally, all results were imported into *Microsoft Excel 2016* and ranked by cluster and eigenvector centrality.

2.4. Interpretation of the Clusters

To interpret the clusters content wisely, every publication in every cluster was represented using the full list of authors, the publication year, and the belonging abstract. Afterwards, a group of ten raters that are unrelated to the project noted the content of the clusters with regards to the publications. With this information, two authors (MD and AES) defined the clusters' main topics individually and compared their results afterwards to choose the final inscription.

3. Results

3.1. Descriptive Results

As illustrated in Figure 1, the number of publications related to CMS and ADHD has increased substantially in the scientific field of psychology/psychiatry from the year 2003 and onwards and in the scientific field of education from the year 2014. The majority of research is done in the United States of America in both fields (Figure 2). As already mentioned, the overlap of literature of the two fields amounted to 7% for the time span from 1900–2019 and 5% for 2015–2019.

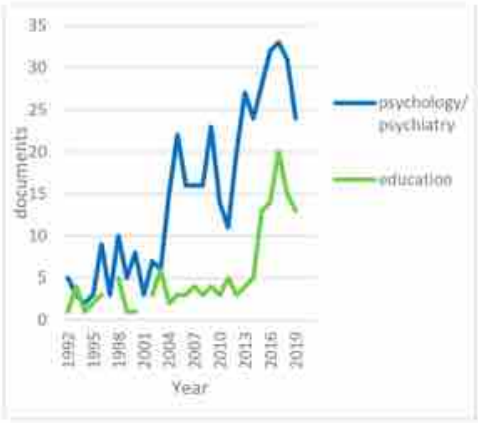

Figure 1. The number of published articles on CMS and ADHD in the scientific fields of psychology/psychiatry (N = 422) and education (N = 143) from 1992 to 2019. Breaks reflect no publications in these years. Note: three documents were published in 1977 and 1982, then there was a gap until 1992.

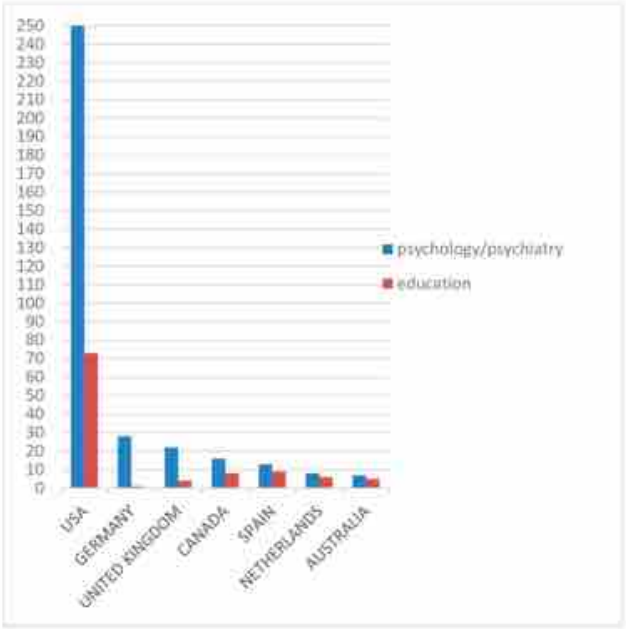

Figure 2. Countries of corresponding authors of the literature on CMS and ADHD in the scientific fields of psychology/psychiatry (N = 422) and education (N = 143). For each scientific field, the five most frequently occurring countries are presented.

3.2. Co-citation Analyses

Co-citation analysis revealed for the field of psychology/psychiatry 389 cited documents. Of these cited documents, 29% were assigned to a first cluster with the main topics *meaning of ADHD in the school* and *psychosocial treatment*; 25% to a second cluster including *medical, behavioral, and cognitive treatment* and *ADHD accompaniments*; 14% to a third cluster targeting *comparisons and combination of treatments* and *family-based factors of influence*; 14% to a fourth cluster with *academic functioning* and *research methods*; 12% to a fifth cluster with *academic performance* and *handling of disruptive behavior*; and 7% to a sixth cluster of *conception of ADHD over lifetime*. For the field of education, co-citation analysis revealed 166 cited documents, 36% of them in a first cluster with the main topics *teachers' perception and handling of challenging behavior*; 18 % in a second cluster with *evidence-based classroom interventions* and *single approaches*; 17% in a third cluster with *self-management and guidance for pupils with ADHD*; 15% in a fourth cluster with *teachers' knowledge and perception of ADHD* and *intervention effects*; and 13% in a fifth cluster with *diagnosis and treatment of ADHD according DSM IV and older*.

The related maps are illustrated in Figures 3 and 4, and detailed corresponding results are presented in Tables 2 and 3. The entire assignment of all documents to the clusters are available as *supplementary material—Bibliometric Review_Co-Citation_spreadsheet 1*.

Many clusters of both fields dealt with similar topics. Teacher-centered clusters only emerged in the field of education. Those clusters contained teachers' knowledge about ADHD as well as their current perception and practice of handling behavior problems in the classroom.

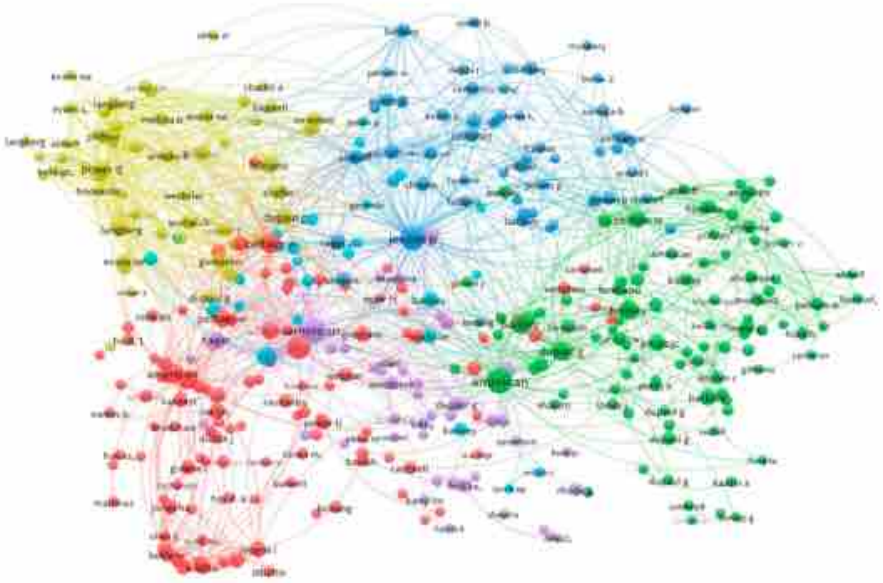

Figure 3. Co-citation analysis results represented as a combination of network maps and clustering for the scientific field of psychology/psychiatry. The analysis of $N = 420$ documents for the time period from 1900–2019 revealed 389 cited documents that subdivided into six clusters indicated by colors (see Table 2 for color codes and clusters' interpretation). Nodes represent cited documents and are labeled with the first author's name. Network ties represent the frequency of co-occurrence in a reference list with thicker lines reflecting higher co-occurrence. To reduce noise, lines were limited to 1000.

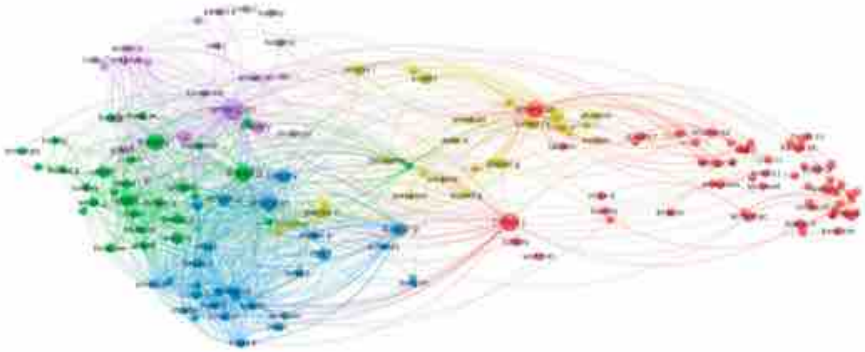

Figure 4. Co-citation analysis results represented as a combination of network maps and clustering for the scientific field of education. The analysis of $N = 130$ documents for the time period from 1900–2019 revealed 166 cited documents that subdivided into five clusters indicated by colors (see Table 3 for color codes and clusters' interpretation). Nodes represent cited documents and are labeled with the first author's name. Network ties represent the frequency of co-occurrence in a reference list with thicker lines reflecting higher co-occurrence. To reduce noise, lines were limited to 1000.

Table 2. Co-citation analysis results for the scientific field psychology/psychiatry. Analyzed was the co-citation of documents in the reference lists of $N = 420$ and documents in the time period from 1900–2019. Presented are the main topics of clusters. The color refers to the corresponding map in Figure 3.

No. of Cited Documents	Main Topic(s)	Color
111	meaning of ADHD in the school; psychosocial treatment	
98	medical, behavioral, and cognitive treatment; ADHD accompaniments	
54	comparison and combination of treatments; influential family-based factors	
54	academic functioning; research methods	
46	academic performance; handling of disruptive behavior	
26	conception of ADHD over lifetime	

Table 3. Co-citation analysis results for the scientific field education. Analyzed was the co-citation of documents in the reference lists of $N = 130$ and documents in the time period from 1900–2019. Presented are the main topics of clusters. The color refers to the corresponding map in Figure 4.

No. of Cited Documents	Main Topic(s)	Color
60	teachers' perception and handling of challenging behavior	
30	evidence-based classroom interventions; single approaches	
29	self-management and guidance for pupils with ADHD	
25	teachers' knowledge and perception of ADHD; intervention effects	
22	diagnosis and treatment of ADHD according DSM IV and older	

3.3. Bibliographic Coupling Analysis

The bibliographic coupling analysis resulted in $n = 189$ connected documents out of both fields and eight clusters, each of them with literature across both areas. The first cluster with the main topics *treatment effects and perception of ADHD* contained 22% of all connected documents; the second cluster *challenging behavioral problems* 18%; the third cluster *programs* and *importance of ADHD in schools, families, and society* 17%; the fourth cluster *self-efficacy* and *knowledge about ADHD* 16%; the fifth cluster *treatment effect studies* 13%; the sixth cluster *moderators of treatment effects* 8%; the seventh cluster *the role of parents/families* 5%; and the eighth cluster *implementation strategies* 2%.

A few general studies on implementation and potential barriers emerged across all clusters (e.g., [29–31]). The studies in the eighth cluster specifically concentrated on how to train practitioners. This cluster contained three studies, a very small number compared to the others. Detailed results are presented in Table 4 and the corresponding map in Figure 5. The entire assignment of all documents to the clusters are available as *supplementary material—Bibliometric Review Bibliographic coupling_spreadsheet* 2.

Table 4. Bibliographic coupling results for the scientific fields of psychology/psychiatry (psych.) and education for the time period from 2015–2019. Out of $N = 202$ analyzed documents, $n = 189$ were connected. Presented are the contents of the clusters. The color refers to the corresponding map in Figure 5.

No. of Documents Total	No. of Documents Psych.	No. of Documents Education	Main Topic(s)	Color
41	23	18	treatment effects and perception of ADHD	
34	14	20	challenging behavioral problems	
32	24	8	programs; importance of ADHD in schools, families, and society	
30	23	7	self-efficacy; knowledge about ADHD	
24	19	5	treatment effect studies	
15	12	3	moderators of treatment effects	
10	10	–	the role of parents/families	
3	2	1	implementation strategies	

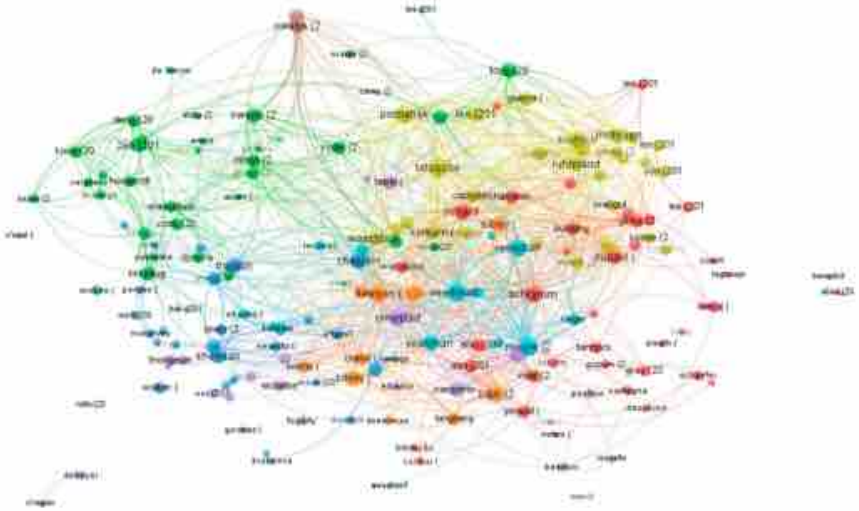

Figure 5. Bibliographic coupling results represented as a combination of network maps and clustering for the scientific fields of psychology/psychiatry and education. The analysis of $N = 202$ documents for the time period from 2015–2019 revealed $n = 189$ connected documents that subdivided into eight clusters indicated by colors (see Table 4 for color codes and clusters' interpretation). Nodes represent documents and are labeled with the first author's name. Network ties represent the number of references cited by both documents. To reduce noise, lines were limited to 800.

4. Discussion

4.1. Study Results

Previous research has shown that students with ADHD benefit from specific CMS that teachers can use to handle the symptoms of ADHD in the classroom. However, despite this, CMS are currently not used regularly in schools with the result that students often do not receive the support they could have [12,14–18]. We assumed that this science–practitioner gap exists because of a communication-related science–science gap between the scientific fields of psychology/psychiatry and education. Therefore, the initial aim of this review was to reveal and compare the structure of both scientific fields. Additionally, we assessed if the corresponding literature already discusses possible implementation barriers.

Our research shows a rising interest in the topic since 2003, which is presumably relatable to the *No child left behind Act* (NCLBA) that passed U.S. legislation in 2002 [32]. Not surprisingly, the primary research in this field is conducted in the U.S. A main requirement of the NCLBA was the implementation of standardized tests in schools in order to regularly assess the learning of each individual student. However, the NCLBA included only few suggestions for teachers as well as little requirements for a better classroom environment that would need educational research [32]. Therefore, it is not surprising that the majority of research in this area is done in the field of psychology/psychiatry, as this field typically deals with standardized assessments. In the scientific field of education, a significant increase

in publication can only be seen since 2014. This might be a rather long-term result of the NCLBA as this act did not only require a learning assessment for children with ADHD but also forced teachers to handle ADHD-related behavioral problems in the classroom, which might have resulted in increasing needs. Due to these new circumstances, the need for support for teachers might have grown, and with it research in the field of education.

4.1.1. Co-citation Analyses: Basis of Current Stock of Knowledge of both Fields

The first hypothesis states that the scientific field of psychology/psychiatry holds a different knowledge regarding the usage of CMS than the scientific field of education. The results found support for this hypothesis, in that there is only an overlap of 7% (40 publications in total) between the two fields from the year 1900 until 2019. From 2015 to 2019, the overlap is even less (5%, 11 publications in total). Co-citation analyses revealed six clusters in the scientific field of psychology/psychiatry and five in the scientific field of education, and those deal mainly with comparable topics. For instance, the topic of handling disruptive/challenging behavior (psychology/psychiatry = cluster 5, education = cluster 1) as well as the meaning of ADHD in school (psychology/psychiatry = cluster 1) or teachers' perception of it (education = cluster 4) occur in both fields. Furthermore, both fields examine the treatment of ADHD (psychology/psychiatry = cluster 1–3, education = cluster 2–4). The main difference in the intellectual knowledge is the focus on teachers' perspective and handling of ADHD-related behavioral problems in the educational scientific field, whereas the scientific field of psychology/psychiatry seems to have a multifaceted view on CMS and ADHD with, e.g., studies comparing different treatments. Furthermore, ADHD over the lifetime is not notably represented in the scientific field of education. In summary, the intellectual knowledge in the two fields does not merge and does not use a shared body of literature, though similar topics are handled. This should be considered to be a serious limitation and one of the most important ways of increasing our knowledge for a certain topic is that the new studies that we design build on the knowledge obtained in previous studies with the aim to reduce the daily practice-gap between mental health and education.

The results of the present review suggest that the strategies used by teachers and how teachers and psychologists/psychiatrists can work together effectively are neglected topics in the field of psychology/psychiatry. A similar picture appears in a previous review that aimed to investigate the effectiveness of psychoeducation for teachers and parents. This review only found one study that included teachers who received psychoeducation by another health professional [33]. Of course, CMS for students with ADHD is a topic that has to be investigated by the scientific field of education. At least since the release of the German S3-guideline for the treatment of ADHD in 2017, in which it is unambiguously claimed that psychosocial treatments are necessary in the treatment of ADHD, this paradigm should have changed [34]. Even the U.S. National Institute of Mental Health (NIMH) claims on its public webpage that CMS need to be part of treating ADHD [35]. However, these are new guidelines, and a limitation of co-citation analyses is that it takes some time before publications are cited. This is the reason why we choose to complement this data analysis with biographic coupling as discussed below; thus, this method is not suitable to detect recent changes in the literature, which leads us directly to the second hypothesis.

4.1.2. Current Research Approaches

Our second hypothesis assumes a communication gap between the scientific fields of psychology/psychiatry and education in the recent literature. This hypothesis does not hold true according to results of bibliographic coupling. In all eight clusters, psychological and educational literature is represented, except for the seventh cluster (*the role of parents/families*), which is only present in the psychology/psychiatry field. Additionally, the clusters are close to each other, indicating a high correspondence. There are two aspects that should be highlighted: The second cluster (*challenging behavioral problems*) includes more educational literature and is distant from the other clusters. Additionally, as mentioned previously, in the seventh cluster (*the role of parents/families*) no

educational literature is included. Interaction with families about CMS is difficult [18], and poor parent–teacher communication is common for children with ADHD [17]. We see that the fields seem to converge recently, but there are still topics that need more attention, such as implementation strategies that will be discussed in the next paragraph. In conclusion, psychologists/psychiatrists should focus more on the handling of challenging behavioral problems, as does the scientific field of education, so that the practitioners in this field know how to collaborate with teachers. Hopefully, a stronger focus on how to deal with challenging behaviors in the classroom within the field of psychology/psychiatry will result in stronger cooperation with teachers.

4.1.3. Investigation of Implementation Strategies and Barriers

The third hypothesis states that scientific literature fails to focus on how to implement CMS in schools, how to support the teachers, and how to overcome possible barriers when implementing the CMS [17]. The results of the present study find support for this hypothesis, as these topics are rarely handled in either psychology/psychiatry or education. This might be one factor contributing to the observed science–practitioner gap. There is research about ADHD, as well as about CMS, and how efficacious they are in handling the symptoms of ADHD, but very few research papers on how to implement such strategies in the classroom and the potential barriers.

4.2. Implications

With this bibliometric review, we are able to set a reference frame and to reveal blind spots of (current) research literature. The interest in the topic of CMS in conjunction with ADHD is rising; however, most research is done in the U.S. More research in different countries is needed, as school systems differ. Though the scientific fields of psychology/psychiatry and education have different knowledge bases that affect the relevant literature, we can see that the handled topics are comparable. The communication between the scientific fields should be improved, otherwise the potential to help students with ADHD is undermined. Scientific activity could be seen as a metaphor for what can happen between psychotherapists/psychiatrists and teachers in real life—both can do good work, but do not exchange key learnings or major issues, so that their potential to support an impaired child is limited.

Even if according to the results of the bibliographic coupling analysis both fields seem to have convergences, in psychology/psychiatry, a greater focus should be on teachers and their role in the treatment of ADHD. Health professionals should research how to advise and interact with teachers, so that an all-encompassing treatment can be developed. Furthermore, in the field of education, more interest in ADHD over the lifetime would be helpful, as ADHD is a disorder that often affects people throughout life and is therefore as relevant for secondary school students as for primary school students. In order for interventions to have a sustainable effect, it should be considered important for future research to take research findings from psychology, psychiatry, as well as education into both scientific fields' consideration.

Specifically, research should focus on how to implement CMS in schools. As we know from previous research, pre- and in-service teachers are lacking knowledge about ADHD, and such a lack proved to be the most important variable influencing teachers' attitudes towards effective and ineffective CMS in handling problematic behavior due to ADHD as well as their intention to use them [15,16]. Not only researchers, but also every practitioner of both fields should have that in mind and should find ways to promote a better exchange and to impart knowledge to one another. For example, it would be helpful for students with ADHD if more consequent-based instead of antecedent-based and corrective behavioral strategies would be used by teachers [14–16]. For instance, to put self-regulation strategies for students with ADHD into practice, a regular exchange between teachers and psychotherapists would be very helpful, as this allows an exchange of ideas about the individual student's needs, resources, and problems [12].

Literature about how to implement CMS and overcome barriers is rare. CMS need more research attention as teachers might know about CMS, but they do not seem to receive support for implementing such strategies and might be unclear how to adjust implementation strategies to optimize CMS.

4.3. Limitations

With this review, we demonstrate a significant gap between the scientific fields of psychology/psychiatry and education regarding their shared knowledge. We assume that this science–science gap is part of the problem of the science–practitioner gap, i.e., effective classroom interventions not being implemented in schools. Of course, this lack in previous science communication is not the exclusive explanation for the observed science–practitioner gap, but it might be a first step to overcome it if more research is focused on both perspectives, as this might increase the overlap in knowledge between fields.

Bibliometric reviews have some strengths compared to other kinds of reviews, such as handling a big set of data and providing a context of literature, but also face some limitations: First, some literature is cited very often, because it is relevant for a specific method, but often this literature has nothing to do with the searched topic (e.g., Cohen [36] is often cited with reference to effect sizes, though this citation has nothing to do with the researched topic). Secondly, the meta-data we use might be biased, as it is gathered by individuals. To limit this, we double reviewed it. Third, it is not possible to filter noise produced by literature that does not reflect the researched topic but complies with the literature search criteria. Thus, we were not able to include the search term "ADD" (attention deficit disorder) in addition to ADHD in our research, because it would be identical to the word "add" and therefore would have produced too much noise.

5. Conclusions

The similarity of both scientific fields seems to have increased over the last years, but there are still aspects that need to be ameliorated so that the science–practitioner gap might get closed. First, more research conducted outside the U.S. is needed, because not all findings are transferable from the U.S. to other countries, due to differences in the school systems. Additionally, the scientific field of education needs to pay more attention to ADHD over the lifetime so that not only younger but also older students receive the support they need. The scientific field of psychology/psychiatry should focus more on the cooperation with teachers when reporting about the treatment of ADHD. Moreover, both fields should concentrate on how to implement CMS in schools, how to train teachers, and how to handle potential barriers.

Supplementary Materials: The following are available online at http://www.mdpi.com/2071-1050/12/17/6826/s1: Bibliometric Review_Co-Citation_spreadsheet 1; Bibliometric Review_Bibliographic Coupling_spreadsheet 2.

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7.2 Studie 2

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What Teachers Think and Know about ADHD: Validation of the ADHD-school-expectation Questionnaire (ASE)

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ABSTRACT

Although an average of one to two children per classroom suffer from ADHD, empirically supported classroom interventions are not yet implemented possibly because of teachers' lack of knowledge or negative attitude towards them. To investigate this science-practitioner gap, we need an instrument assessing knowledge, attitude and the use of ADHD-related interventions. The self-report ADHD Questionnaire by Kos and the ADHD specific knowledge and attitudes scale for teachers by Mulholland et al. are examples of such instruments . Yet, these instruments have primary weaknesses concerning their content validity. Our study validated a newly developed instrument. The ADHD-school-expectation questionnaire (ASE) consists of an ADHD knowledge (24 items), attitude (33 items), and intervention scale (27 items). Attitudes are formed by expectations and related ratings according to Fishbein's and Ajzen's rational choice theory and Ajzen's theory of planned behaviour. Our study results revealed theory-based content validity and good reliability. Therefore, the ASE can be used for future research in the field of ADHD in the classroom.

KEYWORDS

ADHD; attitude; classroom; interventions; knowledge

Introduction

Attention deficit hyperactivity disorder (ADHD) is a neurodevelopmental disorder comprising the three core symptoms inattention, hyperactivity and impulsivity that are required to present cross situationally, i.e. at home and in the kindergarten or school context before the age of six according to the ICD-10 (Remschmidt, Schmidt, & Poustka, 2017) or twelve years according to the DSM-5 (American Psychiatric Association, 2013). ADHD is most often diagnosed when school starts as teachers are faced with those core symptoms respectively the associated behavioural problems in school e.g. children not following teachers' instructions, fidgeting in their chairs, blurting out in the classroom (Campbell, Halperin, & Sonuga-Barke, 2015).

ADHD affects 3% – 5% of children or adolescents worldwide (Polanczyk, Willcutt, Salum, Kieling, & Rohde, 2014), making them present in almost every classroom. To address the associated behavioural problems, classroom interventions have been developed and validated. Although such interventions reveal large effect sizes (Gaastra, Groen, Tucha, & Tucha, 2016) that are comparable to psychostimulant medication or

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psychotherapy (Catalá-López et al., 2017), they are not translated into everyday practice of schools (Ruhmland & Christiansen, 2017). What causes this science-practitioner gap?

Possible Reasons for the Science-practitioner Gap

Lack of Knowledge about ADHD

One relevant factor concerning this science-practitioner gap is teachers' knowledge about ADHD. Knowledge can be defined as the amount of correct information a person possesses (Ajzen, Joyce, Sheikh, & Cote, 2011). So far, only few studies have addressed the relation between knowledge of ADHD and use of classroom interventions. Ohan, Cormier, Hepp, Visser, and Strain (2008) found that teachers with moderate and high knowledge levels of ADHD favoured educational and domestic support; these teachers were also found to perceive more benefit from changes in the classroom than those with low knowledge level. Unfortunately, several investigations have demonstrated that teachers' knowledge of ADHD is often poor and based on false information, which, in turn, contributes to negative perceptions of pupils with ADHD and counteracts the implementation of effective interventions (Ruhmland & Christiansen, 2017; Soroa, Gorostiaga, & Balluerka, 2016). Some teachers and schools participate in knowledge-based training sessions, but their participation does not seem to have resulted in the greater implementation of effective classroom interventions (Moore, Russell, Arnell, & Ford, 2017). A possible reason for this situation can be the type of knowledge that is imparted. General knowledge does not predict a specific behaviour (Ajzen et al., 2011). Correspondingly, knowledge that is related to the behaviour of interest must be communicated. However, the accurate knowledge of ADHD treatment, which is probably the most cogent knowledge regarding classroom interventions, has been often lacking (Ohan et al., 2008).

At present, the role of knowledge of ADHD in implementing evidence-based classroom interventions is difficult to test using available scales, as the latter offers no information on scale construction, factorial, or content validity. These scales fail to mention the underlying relevance of content items in a school context (Kos, 2004; Mulholland, 2016; Sciutto, Terjesen, & Frank, 2000). However, such relevance to school context is crucial in investigating the relation between knowledge and appropriate use of interventions (Ajzen et al., 2011).

Negative Attitude Towards Children with ADHD

Attitude is another relevant factor when considering the use of interventions (Lübke, Meyer, & Christiansen, 2016). Attitude represents individuals' expectations and related rating towards an object. The rational choice theory of Fishbein and Ajzen (1975) suggests that attitude is the sum of expectations multiplied by the associated individual ratings. Attitude consists of a cognitive (beliefs that a person associates with a certain object), an affective (affective reactions that a person expects to be elicited by an object), and a behavioural (former or anticipated future behaviours related to an object) component. An example of the components' interrelationship is: a positive cognitive and affective attitude is often accompanied by a positive behavioural attitude (Haddock & Maio, 2014). A positive behavioural attitude is crucial in demonstrating a specific behaviour, according to Ajzen's theory of planned behaviour (TPB; 1991).

In TPB, the essential factors to predict behavioural intentions and the occurrence of a specific behaviour are: *attitude towards the behaviour* (a person's belief that executing a certain behaviour will lead to a desirable consequence), *subjective norm* (whether people who are important to a person support the intended behaviour and whether that person appreciates what those people think about him/her), and *perceived control* (whether a person is able to reveal the intended behaviour and/or handle a related situation). The neglect of factors like attitude could explain why the latest scientific knowledge has not been put into practice. Therefore, the assessment of teachers' attitudes towards children with ADHD is probably crucial in implementing evidence-based classroom interventions.

Some working groups have assessed teachers' attitudes towards pupils with ADHD using qualitative open-ended questions (Anderson, Watt, Noble, & Shanley, 2012) or quantitative surveys measuring the extent of (dis-)agreement to items (Kos, 2004; Mulholland, 2016). A problem in these instruments is that the investigator decides whether a cognition is positive or negative when evaluating answers or formulating items. According to Fishbein and Ajzen (1975), each person may rate a given aspect differently, as this is already part of his/her attitude. Researchers have suggested different nuances within positive vs. negative ratings that interviewees choose, ranging from −3 to +3.

Additionally, different aspects in existing scales appear confounded. These scales often contain a mix of items on knowledge and beliefs, assess the extent of agreement with prejudices, and/or include items that measure perceived control or subjective norm (Kos, 2004; Mulholland, 2016). This mixture leads to an unclear content-related structure. To our knowledge, no existing measure sets teachers' attitudes towards children with ADHD as a distinct variable.

The Present Study

To address the science-practitioner gap and implement evidence-based classroom interventions, knowledge of and attitudes towards pupils with ADHD needs to be investigated. Developing an instrument that assesses these factors accurately is the first step to improving the treatment of pupils with ADHD.

The newly constructed ADHD-school-expectation questionnaire (ASE) should thus contain knowledge, attitude, and intervention scales. The knowledge scale should focus on knowledge of symptoms, aetiology, diagnostics, prevalence, and interventions that enable teachers to identify pupils with ADHD and treat them effectively. The attitude scale should assess expectations and related ratings to operationalise teachers' attitudes towards pupils with ADHD following Fishbein and Ajzen (1975) rational choice theory. This scale should also include the cognitive and affective components of attitude. The cognitive part should focus on situations in a classroom setting, which the interventions are addressing. Finally, the intervention scale should assess the use of interventions and their effectiveness ratings. The latter represents the expectation of a positive consequence and behavioural component of attitude.

Overall, this study validated the new ASE to determine whether it is psychometrically sound and can be used to assess teachers' knowledge and attitude towards children with ADHD, as well as teachers' attitudes towards and their use of evidence-based classroom interventions in this context.

Methods

Study Design and Procedure

This validation study was conducted without blinding or randomisation, via an online survey on https://www.soscisurvey.de. It was administered to pre-service teachers in the first step and in-service ones in the second step.

Existing scales on teachers' knowledge and attitudes of ADHD and affected children were reviewed. The ASE's initial version was piloted and then rated by two child and youth psychology experts and three in-service teachers. Then minor changes with respect to wording were made. The ASE's final version was validated among pre-service teachers, as they were most likely to receive updated information. A cover letter providing a detailed study information and link to the online survey was disseminated among German university email lists and Facebook. After three weeks, a reminder was sent. Data collection lasted for two more weeks. A Nintendo Switch (value about EUR 350) and three vouchers worth EUR 50 were raffled to encourage participation in this study.

The examination of the psychometric properties of the ASE was afterwards replicated with in-service teachers.

Participants

Data from N = 1,086 pre-service teachers, who completed at least 75% of the items per scale, were used in the analysis (N = 1741, drop out: n = 655; 37.62%). Participants' mean age was 23.22 years (SD = 3.93 years). There were 30.57% male, 68.97% female, and 0.46% other. The distribution of school types for which they were educated is illustrated in Table 1 (supplemental material). All participants provided written and informed consent after study information. Participation was completely anonymous and voluntary. Participants could always opt out without stating the reason.

Replication Study

The study was replicated with data from N = 599 in-service teachers, their mean age was 41.33 years (SD = 10.01 years). There were 17.67% male and 82.30% female participants.

ASE Development

The ASE comprised three scales: 1) knowledge of, 2) attitude towards, and 3) school-based interventions for pupils with ADHD.

Knowledge Scale

We aimed to document the knowledge scale's content validity. All items were therefore related to teachers' use of interventions.

Choice of Categories

Options for categorising knowledge were researched. We decided on knowledge of *symptoms, aetiology, diagnostics, prevalence,* and *interventions* to be important for teachers to know a) whether a child is affected by ADHD, and if so, b) that there is nobody to blame, c) that a valid diagnosis is not given intuitively or inflationary, and d) that interventions are useful. This knowledge is expected to be the basis for their willingness to use evidence-based classroom interventions for pupils with ADHD. *Diagnostics* and *prevalence* were combined as both are related to how and how often ADHD is diagnosed.

Item Construction

After item construction, the number of items per category was set to six, including the most important aspects, according to expert judgements. Items were designed for laypeople and to be easy to answer. Only correct knowledge of ADHD according to evidence, current guidelines, and common ADHD-related myths among teachers mentioned in other studies (Ruhmland & Christiansen, 2017) were integrated. Items stated accurately and falsely were balanced for every category. The order of all items was randomised.

The knowledge scale contained 24 items from the *symptoms, aetiology, diagnostic and prevalence,* and *intervention* categories. After conducting a pilot study, two items of the *intervention* category were rephrased in accordance with the feedback. As a result, one item that was stated falsely and five items that were stated accurately were left in this category.

Answer Format

A visual true-or-false analogue scale (VAS) was used to enhance compliance. This answering format is known to be valid and reliable (Ahearn, 1997). The VAS was subdivided into 12 sections so that the cursor could move smoothly. Only a correct answer within the first sixth of the VAS was granted one knowledge point, as our main focus was to examine what items were certainly correctly answered. Participants could earn 24 knowledge points.

Attitude Scale

This scale should assess teachers' attitude towards pupils with ADHD based on Fishbein and Ajzen (1975) rational choice theory, including expectations and their related ratings. We included the cognitive and affective aspects of attitude. Assessing the behavioural component to address previous behaviours is pointless when investigating changes in attitude. The anticipated future behaviour was incorporated into our effectiveness ratings to represent the expectation that the use of interventions will trigger a positive consequence. It was integrated into our intervention scale.

Cognitive Component

The cognitive part focused on teachers' expectations concerning pupils with ADHD, especially during classroom instructions. We assessed their attitudes towards academic

studies (22 items: main focus during classroom instruction) and social behaviour (five items) in class. We based the ASE attitude scale on ADHD symptoms and current myths (Ruhmland & Christiansen, 2017), which were balanced as positive and negative statements. Teachers were asked to rate how likely they were to expect pupils with ADHD to exhibit the specified characteristics and how they would rate those characteristics in general.

Affective Component

The affective part assessed the emotions that teachers generally feel in their job (Lee et al., 2016). The items were balanced between positive and negative emotions. Teachers rated how likely for pupils with ADHD to elicit such emotions in them and how they would rate those emotions in general.

Answer Format

The total scale included 33 items (6 affective and 27 cognitive ones, with the latter targeting academic studies [22 items] and social behaviour [five items]). The cognitive items were answered first; they represented the most important influence on attitude. The affective items were answered next. The order of presentation of cognitive and affective items was randomised. The expectation of likelihood (VAS scale from 0 = *unlikely* to 1 = *likely*) and positive or negative ratings (VAS scale from −3 = *negative* to 3 = *positive*) were required in all items. The VAS ratings were clustered into six sections. To operationalise the variable *attitude*, every expectation was multiplied by its related rating. All results were added up.

Intervention Scale

The intervention scale assessed teachers' attitudes towards and the use of school-based interventions for pupils with ADHD. Items were formulated neutrally. The scale contained 27 items addressing intervention strategies; these were divided into 15 effective and 12 ineffective strategies based on previous studies (Dupaul, Eckert, & Vilardo, 2012; Miranda, Presentación, & Soriano, 2002). The order of presentation was randomised. The (estimated) use of the intervention strategy (VAS scale from 0 = *never* to 1 = *very often*) and its estimated effectiveness (VAS scale from 0 = *not effective at all* to 1 = *very effective*), which represented the attitude towards the behaviour, were required in all items. The VAS ratings were clustered into six sections.

Data Analysis

Data were downloaded from https://www.soscisurvey.de as an *IBM SPSS Statistics* file. Analyses were conducted using *IBM SPSS Statistics 24 (2016)* and *IBM SPSS AMOS 24 (2016)*. After excluding the questionnaires with at least 25% incomplete answers per scale, recoding the items, and calculating the knowledge points, attitude values, and intervention use, a descriptive statistical analysis was conducted, followed by a confirmatory factor analysis (CFA). If the CFA did not reveal satisfactory model fits, an exploratory factor analysis (EFA)

was performed to establish the scale's factor structure. No factor analysis was conducted for the intervention scale, as its construction was not theory-based but represented findings from earlier studies. As an indicator for discriminant validity, the correlations between various scales were calculated. Finally, the scales' psychometric properties were computed.

CFA

The CFA factors were allowed to correlate, which is theoretically plausible. To identify the model, variances of the latent variables were fixed to one. The maximum-likelihood-method was used to estimate the parameters. The *χ2/degrees of freedom (df)* value was used to assess the model-fit inferential; *χ2/df* values between 0.000 and 2.000 and between 2.010 and 3.000 represented good and acceptable model fit, respectively. As the *χ2/df* value can be influenced by a large sample size, the root mean square error of approximation (RMSEA), comparative fit index (CFI), and normed fit index (NFI) as descriptive measures were considered. RMSEA values <.050 represent good and RMSEA values between.051 and .080 acceptable fit. CFI values between 0.970 and 1.000 and NFI values between 0.950 and 1.000 were interpreted as good model fit; CFI values between 0.950 and 0.969 and NFI values between 0.900 and 0.949 indicated acceptable model fit (Moosbrugger & Schermelleh-Engel, 2012).

Knowledge Scale: CFA Models

We tested three different models for the knowledge scale. Model 1 assumed the four factors (i.e., *symptoms, aetiology, diagnostic and prevalence*, and *intervention*) as analogous to the chosen categories. Model 2 subdivided each of these factors into one representing information that was stated falsely and another that was stated accurately, and assumed eight factors. Model 3 represented an even more detailed bi-factor model, assuming the eight factors of model 2 and a general *ADHD knowledge* factor.

Attitude Scale: CFA Models

Two different models were tested for the attitude scale. Model 1 assumed *academic behaviour, social behaviour*, and *elicited emotions* factors. Model 2 subdivided each factor into a positive and negative element and assumed six factors.

EFA

We applied principal component extraction with Varimax rotation. The Kaiser-criterion, which suggests extracting factors with an Eigenvalue > 1, was used. As this criterion often overestimates the number of relevant factors, we also considered the scree test (Moosbrugger & Schermelleh-Engel, 2012).

Results

We present results of the main study with pre-service teachers first; those are followed by the replication with in-service teachers.

Descriptive Results

On average, participants earned 7.23 knowledge points (*SD* = 4.21, maximum = 22.00, minimum = 0.00).

In the 33-item attitude scale, all expectations were multiplied by their related ratings and then added together. The mean attitude score was −11.60 (*SD* = 13.92, maximum = 44.80, minimum = −72.60). Table 2 (supplemental material) visualises the expectation probability and average ratings of items.

Participants' mean level use of all interventions was 0.55 (*SD* = 0.09), of effective interventions was 0.72 (*SD* = 0.12), and of ineffective interventions was 0.35 (*SD* = 0.14). The average effectiveness rating for all interventions was 0.52 (*SD* = 0.09), for effective interventions was 0.73 (*SD* = 0.13), and for ineffective interventions was 0.26 (*SD* = 0.012). Table 3 (supplemental material) presents the results of each item.

Knowledge Scale

The CFA for model 1 revealed $\chi 2/df = 4.76$, *RMSEA* = 0.06, CFI = 0.73 and NFI = 0.68. Only the RMSEA value suggested an acceptable model fit.

Model 2 resulted in $\chi 2/df = 2.81$, RMSEA = 0.04, CFI = 0.88 and NFI = 0.83. The $\chi 2/df$ and RMSEA values indicated an acceptable and good model fit, respectively. The CFI and NFI values did not show good fit.

The bi-factor model resulted in an overall good model fit: $\chi 2/df = 1.88$, RMSEA = 0.03, CFI = 0.95 and NFI = 0.90. This model covered our ideas of the knowledge scale development. Thus, this result indicated good content and construct validity.

Cronbach's α of .80 indicated good internal consistency and reliability for the knowledge scale. Each item difficulty and discriminatory power is presented in Table 4 (supplemental material). The values fall within a methodologically acceptable range.

Attitude Scale

The CFA of model 1 revealed an overall unsatisfactory model fit; $\chi 2/df = 14.50$, RMSEA = 0.11, CFI = 0.45 and NFI = 0.41.

Model 2 resulted in $\chi 2/df = 3.92$, RMSEA = 0.05, CFI = 0.88 and NFI = 0.84. Only the RMSEA value indicated an acceptable model fit. Both CFA results did not support our primary assumptions of the attitude scale development.

A subsequent EFA suggested six factors according to the Kaiser-criterion with Eigenvalues of 6.05, 5.68, 1.80, 1.68, 1.04, and 1.01. The rotated factor matrix is shown in Table 5 (supplemental material). All items tended to load on factors that distinguished between positive and negative aspects: factor 1, *positive behaviour*; factor 2, *negative behaviour*; factor 3, *negative emotions*; factor 4, *outstanding negative behaviour*; factor 5, *outstanding positive behaviour*; and factor 6, *positive emotions*. The scree test suggested mainly two factors. Therefore, we performed a second EFA with two fixed factors (i.e., *negative* and *positive* aspects), with eigenvalues of 6.05 and 5.68 (see Table 6 [supplemental material] for details).

Both EFA solutions represented rating nuances that were a core aspect in developing the attitude scale. The more detailed solution also differentiated cognitive and

affective factors. The results therefore indicated content and construct validity for the ASE's attitude scale. The two-factor-solution was less generous and should be preferred.

The attitude scale's internal consistency revealed a Cronbach's α of .85, representing good internal consistency and reliability. The *negative* and *positive aspects* of the subscale's internal consistency accounted for a Cronbach's α of .87. The items' discriminatory power is shown in Table 2 (supplemental material).

Intervention Scale

We calculated the intervention scale's psychometric properties separately for the use of and estimated effectiveness of the interventions. Both calculations revealed a Cronbach's α of .73, representing good internal consistency and reliability. The items' discriminatory power is presented in Table 3 (supplemental material).

Inter-scale Correlations

The correlation between knowledge and attitude resulted in $r = -.09$. The use of interventions correlated to $r = .12$ with knowledge and to $r = -.18$ with attitude. The rating of interventions correlated with knowledge to $r = .09$ and with attitude to $r = .09$. These low inter-correlation results indicated distinct variables. Detailed results for the subscales' correlations are presented in Table 7 (supplementary material).

Results of the Replication Study with In-service Teachers

Descriptive analysis for the group of in-service teachers resulted in $M = 9.25$ ($SD = 4.29$) knowledge points, and an average attitude score of −13.12 ($SD = 14.66$). Their mean use of all interventions was 0.57 ($SD = 0.09$), 0.74 ($SD = 0.13$) of effective, and 0.36 ($SD = 0.14$) of ineffective interventions. The average effectiveness rating for all interventions was 0.54 ($SD = 0.09$), 0.76 ($SD = 0.14$) for effective, and 0.26 ($SD = 0.13$) for ineffective interventions.

The CFA for the bi-factor model of the knowledge scale resulted in an overall acceptable model fit and good internal consistency: $\chi 2/2 = 1.59$, RMSEA = 0.03, CFI = 0.93 and NFI = 0.85, and Cronbach's $\alpha = .78$.

For the attitude scale, the scree test suggested two factors that were analogous to the main study, with Eigenvalues of 5.89 and 4.70. Cronbach's α was .85 for the total attitude scale, .86 for the negative subscale, and .84 for the positive subscale. All values represented good internal consistency and reliability.

Cronbach's α for the intervention scale was .72 for the use and .75 for the estimated effectiveness of the interventions, indicating good internal consistency and reliability.

In summary, the results of the study with pre-service teachers could be replicated by the sample of in-service teachers. This further supports the ASE'S content and construct validity as well as reliability.

Discussion

The present study demonstrated how the ASE assesses pre- and in-service teachers' knowledge of, attitudes towards, and use of school-based interventions for pupils with ADHD and that it revealed solid psychometric properties.

Knowledge Scale

The knowledge scale resulted in a bi-factor model, with the *symptoms, aetiology, diagnostic and prevalence*, and *intervention* categories subdivided into stated accurately and stated falsely, and a general *ADHD knowledge* factor. This bi-factor model was complex but covered the central aspects of the scale development process, revealing content and construct validity. The Cronbach's *α* value confirmed the knowledge scale's good reliability.

The descriptive results of this study demonstrated that pre- and in-service teachers seem to have limited knowledge of ADHD. Items might have been too difficult, as none of the participants could answer all questions correctly (on average, not even half of the questions were answered correctly). However, item difficulties were predominantly methodologically acceptable as the values ranged (except for one item) between .05 and .95, with an average value of .30. Moreover, teachers' poor knowledge of ADHD is consistent with previous findings in this field (Ruhmland & Christiansen, 2017; Soroa et al., 2016). Nevertheless, a study with child and adolescent psychotherapists, who can be expected to possess solid knowledge of ADHD, supported methodologically acceptable item difficulties (Dort et al., in preparation). Some knowledge items also did not reveal good discriminatory power values. However, this can be attributed to associated item difficulties, which were mainly items that were answered incorrectly by nearly all participants, e.g. the item *'Approximately 3–4 pupils per class* are affected by ADHD'* resulted in a low item difficulty value of .08 with a low discriminatory power of 0.19.

Attitude Scale

The attitude scale was assumed to load on *academic behaviour* and *social behaviour* factors (cognitive aspect) and *elicited emotions* (affective aspect). The study results did not support such a factor structure. Instead, the exploratory analysis revealed that the items mainly load on one factor representing *positive aspects* and another representing *negative aspects*. A more differentiated EFA revealed the six factors *positive behaviour, negative behaviour, negative emotions, outstanding negative behaviour, outstanding positive behaviour*, and *positive emotions*. Those factors demonstrated different nuances of positive and negative ratings and that the cognitive and affective items load on different factors. This pattern of results is consistent with the developmental process of the scale, as we distinguished between cognitive and affective aspects as well as positive and negative ones. Furthermore, different nuances of positive and negative aspects fit the rational choice approach (Fishbein & Ajzen, 1975) that the scale was based on. Thus, the scale is meeting content validity criteria. Our analysis of internal consistency revealed good reliability for the attitude scale as a whole and subscales on *attitude towards positive aspects* and *attitude towards negative aspects*. Considering the attitude scale as a whole,

some discriminatory power values were quite low. However, within the corresponding subscale, all discriminatory power values fell within the medium-to-high range, e.g. the item *'is creative'* of the attitude scale only obtained a discriminatory power value of 0.19, but the discriminatory power of the corresponding attitude scale *'attitude towards positive aspects'* obtained a value of 0.35.

The ASE improves the critical aspects (e.g., confounding different variables) of existing instruments assessing attitude (Kos, 2004; Mulholland, 2016). The ASE attitude scale has the advantage of differentiating attitude's aspects. By measuring expectations and their associated ratings separately, as well as cognitive and affective aspects, we can investigate which of these elements are particularly important when trying to change teachers' attitudes towards pupils with ADHD.

Intervention Scale

We did not investigate the intervention scale's content validity, as the construction was based not on theoretical assumptions but previous research findings. The scale revealed good reliability and allows for assessing the use of interventions and their estimated effectiveness. The latter represents the attitude towards the use of interventions as it exploits the expectation that this would have a positive consequence.

The descriptive results of this study suggested that pre- and in-service teachers can estimate the effectiveness of interventions correctly. Both groups are assumed to employ ineffective interventions. This finding is congruent with results of previous studies that demonstrated the use of ineffective interventions (e.g. Ruhmland & Christiansen, 2017). However, so far it was unknown that the teachers themselves do not believe in the effectiveness of the identified ineffective interventions.

Implications

The present study introduces the ASE as an instrument to measure knowledge of, attitudes towards pupils with ADHD, and attitudes towards and the use of classroom interventions for pupils with ADHD. Such an instrument builds the basis for further investigation of the science-practitioner gap regarding the implementation of evidence-based classroom interventions for pupils with ADHD. This fact represents the motivation for the development of the ASE.

So far, studies predominantly highlighted the existence of the mentioned science-practitioner gap (e.g. Ruhmland & Christiansen, 2017). Though reasons for such a gap as well as possibilities to close it have rarely been addressed yet (Dort et al., 2020). With the ASE, first examinations could be conducted regarding the role of the variables knowledge and attitude in this context as both are significant factors moderating the use of classroom based interventions (Strelow, Dort, Schwinger, & Christiansen, 2020). Future studies should continue addressing implementation possibilities as well potential barriers. In a recently conducted bibliometric review we could show that this topic is rather neglected in research regarding the use of classroom interventions for pupils with ADHD (Dort et al., 2020). In this regard, the ASE could be used to evaluate intra-individual changes or the effects of implementation programs for example.

Further, as the ASE's instruction can easily be adapted, it could also be used to assess attitudes towards other pupils. A study comparing teachers' attitude towards pupils with ADHD, average pupils and ideal pupils to find out difference between the teachers' current and desired classroom situation is currently in progress (Dort et al., in preparation).

Limitations

As a first limitation, we have to state that the pre-service teachers were heterogeneous in terms of their amount of classroom experience, so that only the estimated use of interventions could be assessed. Our scale's properties and structure had to be confirmed in a sample of in-service teachers. Although this revealed comparable results, future research should investigate the relation among variables, such as experience, knowledge, attitude, and intervention use. A study that addresses this topic and aims to present a model of the relationships of the variable has just been published (Strelow et al., 2020).

Another limitation is the knowledge scale's bi-factorial solution. Although this final structure is more reasonable than the basic factors alone, it limits the possibility of creating differentiated subscales. Owing to scoring only a correct answer within the first sixth of the VAS with one knowledge point, the information content is also rather low. Our main focus was to reduce guessing and determine whether teachers know a correct answer for sure. Using the VAS provides the advantage that scoring can be adjusted and more information on answering behaviour can be gained if desired.

We assumed some general knowledge of ADHD to be potentially a relevant basis for the use of evidence-based classroom interventions for pupils with ADHD. Future research must identify whether this is true or only specific knowledge of interventions is enough. So far, a model by Strelow et al. (2020) suggests a significant influence of general knowledge measured by the ASE on the effectiveness rating and intention to use effective interventions.

Additionally, the ASE's cognitive items mainly asked for expectations related to pupils' behaviours during lessons, as classroom interventions focus on such situations. Expectations considering breaks or homework situations, among others, could conceivably also affect teachers' attitudes towards pupils with ADHD. Asking for cognitive expectations first could have had an effect on affective expectations. Queries about emotions first might be taken more personally and influence the willingness to complete the questionnaire.

The correlations of ASE scales' variables were not compared with those of the same variables in other similar instruments, so that, inter-correlations cannot be interpreted exhaustively. However, the low inter-correlations suggest distinct variables. More information on the relation of knowledge to attitude scale values and other measures or external criteria would be desirable and must be addressed in future research. Nonetheless, the results of this study supported the theoretically underlying assumptions of the scale constructions indicating content validity.

Conclusion

In conclusion, we described the development and validation of a comprehensive instrument to measure pre- and in-service teachers' knowledge of, attitudes towards pupils

with ADHD, and attitudes towards and the use of classroom interventions for pupils with ADHD. Indications of the ASE's content validity and reliability were successfully confirmed. Therefore, this study provides a theory-based instrument that improves on the limitations of previous research. The ASE demonstrated its usability in another study (Strelow et al. (2020) and can now be used to investigate the relation of the variables included in this questionnaire and the potential to influence them (e.g. with expectation violation) as further steps in closing the science-practitioner gap concerning classroom interventions for pupils with ADHD.

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7.3 Studie 3

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Article

Working with Children with ADHD—A Latent Profile Analysis of Teachers' and Psychotherapists' Attitudes

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Abstract: A positive attitude of teachers and psychotherapists towards children with ADHD can both support their mutual relationship and support reducing ADHD-related symptoms. According to Fishbein and Ajzen's rational-choice approach, attitude formation is based on a person's expectations and the appraisal of these, thus attitude, therefore, differs individually. The present study aimed to identify different attitude profiles based on our participants' answer patterns on the ADHD-school-expectation questionnaire's (ASE) subscales, and to examine which attitude profile would be desirable for professionals working with children with ADHD. We conducted a latent profile analysis and investigated differences between the latent profiles. Our analysis revealed three attitude profiles characterized by negative, moderate and extreme ratings of expectations. The attitude profiles differed in further variables such as the use and effectiveness of rating classroom management strategies, knowledge of ADHD, perceived control, stress and strain, as well as some personality traits. The extreme rating profile seems to be beneficial for children with ADHD, whereas the moderate rating profile might appeal to certain professionals.

Keywords: ADHD; attitude; teachers; psychotherapists; latent profiles; classroom management strategies

1. Introduction

Statistically speaking, one to two children worldwide in every classroom (with an average class size of 30 children) will suffer from Attention Deficit/Hyperactivity Disorder (ADHD) [1,2]. The core symptoms—inattention, hyperactivity, and impulsivity—appear in the classroom through behaviors such as not listening, not following instructions, fidgeting in the chair, or blurting out answers—behavioral problems that contribute to perceived classroom stress. Thus, ADHD is often first identified when families seek professional support (e.g., psychotherapy, psychiatric care) once children have entered school [3]. Hence, both teachers and clinicians are professionals often in contact with children with ADHD, and whose encounters with such children may not be always positive. An important factor for such contacts is to opt instead for solid, supportive collaboration, thus improving the relationship between the professionals and children with ADHD [4,5].

Studies demonstrate that teachers' behavior influences the work habits of children with ADHD positively, as do social processes in the classroom such as the teachers' feedback, which affects their peers' perception of a child [6–8]. If teachers apply specific classroom management strategies (CMS), their behavior can also significantly change children's behavior, for instance by leading to reduced ADHD symptoms [9]. Such use of CMS can contribute to both a less stressful classroom environment and potentially disrupt dysfunctional trajectories, as handling ADHD-related symptoms positively

might affect developmental pathways and result in disrupting certain psychopathologies [10–13]. Further, teachers can influence a student's performance by their expectations about that student—even when teachers are trying to seem neutral [14].

However, students with ADHD often feel misunderstood and treated unfairly by their teachers, whereas teachers often feel overwhelmed by the children's behavior, resulting in an uncomfortable situation for both and a worsening relationship [15,16]. Such bilateral discomfort might originate from mutual attitudes, as attitudes constitute a person's expectations and their ratings (i.e., positive or negative) thereof [17]. It is assumed that our cognitive (beliefs) and affective attitude (expected elicited emotions) towards a person influence our behavioral attitude [18,19] which, according to the Theory of Planned Behavior (TPB) [20], influences our intention to engage in a specific behavior that finally results in that behavior being shown. With respect to teachers working with children with ADHD, their potentially negative attitudes might contribute to an interaction spiral so that they repudiate children with ADHD who, in turn, keep acting out, as they are feeling misunderstood and rejected [18].

Psychotherapists are another group that regularly works with children with ADHD, thus they also form attitudes that result in specific interactive behavior with those children [18–20]. In contrast to teachers, however, there is, to our knowledge, no literature to date examining the attitude of psychotherapists towards children with ADHD. As psychotherapists are professionals who have explicitly chosen to work with patients exhibiting behavior problems, one could hypothesize that in general, they would be understanding and show a positive attitude towards children with ADHD. On the other hand, such children might be perceived as demanding and difficult, and psychotherapists might prefer patients with other disorders to those with ADHD.

As both teachers and psychotherapists are professionals working with children, and as attitudes towards children with ADHD can influence their interactions with such children, this study aims to identify latent attitude profiles of both groups. We assume that some profiles might prove to be more advantageous than others when working with children with ADHD. For this purpose, we also consider direct experiences, social influences, and individual differences that are known to influence expectations and, consequently, attitudes [17,21,22]. Especially in the case of teachers, those factors might also influence the use of CMS [23,24].

As Strelow, Dort, Schwinger, and Christiansen point out [25], an important *direct experience* in this context can be the perceived stress that children with ADHD elicit that supports the expectation of further negative interactions. Job experience can also be assumed to be a direct experience with potential influence on expectations and thus attitude. However, previous studies found no effect of job experience of in-service teachers on their intention to use effective CMS and on their attitude towards children with ADHD; only an effect moderated via knowledge and perceived control [26,27]. Next to in-service teachers, a big group of our sample was pre-service teachers that cannot be expected to have job experience yet. Therefore, it was not of additional value to assess this variable in this group. Accordingly, we did not take this variable into account in the present study. The age of the children professionals work with could also shape experiences, as studies show different handling of ADHD symptoms of children in primary- and secondary school [27–29]. Due to the fact that the different (sub) groups in this sample work with children with a different range of ages, a clear categorization of the children's age would have been difficult. Thus, the present study aims to give a general overview of professionals' attitude towards children with ADHD.

Considering social influences, the subjective norm (i.e., what I perceive as relevant in a specific context) could be relevant, as according to the TPB, this variable influences both the formation of expectations and the intention to display a specific behavior, such as the use of CMS.

Perceived behavioral control should not just be considered as an individual difference influencing expectations, as it also influences the intention to reveal a specific behavior and its actual realization [20]. Knowledge about ADHD and general stress represent further individual differences known to influence teachers' expectations and their attitude toward children with ADHD [30–32]. Additionally, study results suggest the Big Five personality traits, as well as Social Dominance

Orientation (SDO) and Right Wing Authoritarianism (RWA), play an important role in predicting individual prejudices that influence expectations and attitudes [22,33]. The disposition stress reactivity may also be relevant in this context, as it moderates the relationship between the stress event and stress reaction, which, in turn, are related to the concept of abilities [34,35], and therefore perceived behavioral control. Stress reactivity could thus influence the aforementioned potentially relevant factors, namely strain, perceived stress elicited by children with ADHD, and perceived behavioral control.

To summarize, we aim to (1) compare the attitudes of teachers and psychotherapists towards children with ADHD; (2) identify latent attitude profiles; and (3) investigate which attitude profile is advantageous for professionals working with children with ADHD by taking the potential moderators direct experiences, social influences, and individual differences into account. We further hypothesize that psychotherapists' attitude will be more positive than teachers' attitude and that latent attitude profiles will differ in the variables stress, perceived control, subjective norm, knowledge as well as personality traits.

2. Materials and Methods

2.1. Study Design and Procedure

This study was conducted via three online surveys on https://www.soscisurvey.de addressing pre-service, who we defined as education majors that are not regularly teaching in schools, and in-service teachers as well as psychotherapists in training (PIT). The surveys differed only in the wording, which was adjusted for each group according to its usage in their working context (e.g., pupils for teachers—children for psychotherapists). Pre-service teachers and PIT were assumed to be rather accessible groups that reflect the effects of the current education of professionals that work with children with ADHD. In-service teachers also represent a big group that works with children with ADHD. Additionally, this group can be assumed to have quite a lot of experience in working with affected children. Therefore, this group was also included in the study.

A cover letter provided detailed study information as well as the corresponding link to the online survey that was disseminated via different German university e-mail lists, schools, institutions for psychotherapy training and Facebook groups for pre- and in-service teachers. Data collection lasted, on average, five weeks, including a reminder after the first three weeks. Each group had the option of choosing a Nintendo Switch, two tickets to a musical, or a spa weekend for two (value about 350 EUR); three vouchers with a total value of 150 EUR were raffled to encourage participation in the study.

2.2. Participants

We collected data from N = 1794 participants. Detailed information on participants' characteristics are presented in Table 1.

2.3. Measures

2.3.1. The ADHD School Expectation Questionnaire (ASE)

Attitude towards children with ADHD, knowledge about ADHD, and the use of and attitude towards interventions for children with ADHD were measured via the ADHD-school-expectation questionnaire (ASE) [36]. It assesses attitude with 33 items. For every item, the expectation from 0 = unlikely to 1 = likely and the related rating from −3 = negative to 3 = positive are stated on separate visual analogue scales (VAS). The variable attitude is then calculated by the multiplication of expectation and its related rating for every item, which are added together to obtain a total scale value, although two subscales (attitude towards positive aspects and attitude towards negative aspects) can be derived [17]. Cronbach's α calculation for the total attitude scale is 0.85.

Table 1. Detailed information about N = 1794 participants' characteristics.

Group	N	%	Male	Female	Diverse	Age *M* (*SD*)
pre-service teachers	1086	60.5	332	749	5	23.22 (3.93)
PIT	109	6.1	21	88	0	30.94 (5.24)
in-service teachers	599	33.4	106	493	0	41.33 (10.01)
Total	1794	100.0	459	1330	5	29.74 (10.73)
Subgroup						
pre-service_elementary school	279	15.6	44	234	1	22.54 (3.92)
pre-service_middle school	179	10.0	64	114	1	24.08 (4.48)
pre-service_senior high school	488	27.2	193	293	2	23.16 (3.59)
pre-service_special needs school	109	6.1	22	87	0	23.31 (3.70)
in-service_elementary school	304	16.9	30	274	0	42.23 (9.81)
in-service_middle school	157	8.8	45	112	0	39.52 (9.37)
in-service_senior high school	42	2.3	16	26	0	38.24 (9.85)
in-service_special needs school	56	3.1	10	46	0	43.59 (11.04)
PIT—children	105	5.9	19	86	0	30.96 (5.33)
PIT—adults	4	0.2	2	2	0	30.50 (2.52)

Note: PIT = psychotherapist in training; subgroup contains *n* = 71 missing.

The knowledge scale in the ASE contains 24 items about symptoms, etiology, diagnostics & prevalence, and interventions. All items are answered with a VAS from true to false. A correct answer within the first sixth of the VAS is granted one knowledge point; Cronbach's α is 0.81.

The intervention scale in the ASE includes 15 effective and 12 ineffective intervention strategies that are rated on two VAS according to their usage from 0 = never to 1 = very often and the estimated effectiveness from 0 = not effective at all to 1 = very effective. For the present data, Cronbach's α was 0.72 for the usage and 0.73 for the effectiveness rating.

2.3.2. Perceived Attitude towards Children with ADHD

Participants' perceived attitude was assessed by requesting them to state how positive or negative they judged their attitude to be towards children with ADHD. This was answered on a VAS from −3 = negative to 3 = positive [25,36].

2.3.3. Perceived Behavioral Control

Perceived behavioral control was measured with the two items I have the ability to teach children with ADHD effectively and Dealing with children with ADHD exceeds my abilities constructed according to the TPB [20]. The answering format was a VAS varying from 0 = totally disagree to 5 = totally agree [25,36]. Cronbach's α was 0.82 for the present data.

2.3.4. Subjective Norm

Subjective norm was measured with three items: I want persons who are important to me to think positively about me; To do something that I know others consider to be unethical makes me lose my self-respect; I don't care whether others have a poor opinion about me. The items were assessed with a VAS ranging from 0 = totally disagree to 5 = totally agree [25,36]. Cronbach's α for the present data was 0.51.

2.3.5. Personality

To assess personality, we used the short German version of the Big Five Inventory (BFI) [37]. It contains 21 items and uses a five-point Likert-scale ranging from 0 = very inapplicable to

5 = very applicable to assess the facets Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. For the present data, Cronbach's α calculation revealed the following results: Extraversion α = 0.78, Agreeableness α = 0.57, Conscientiousness α = 0.74, Neuroticism α = 0.68, and Openness α = 0.76.

2.3.6. Social Dominance Orientation (SDO)

SDO was measured via the German scale designed by Cohrs, Moschner, Maes, and Kielmann [38], based on the scale by Pratto, Sidanius, Stallworth, and Malle [39] and Six, Wolfrath, and Zick [40]. The 12 items (e.g., Social equality should increase.) are answered on a six-point Likert-scale ranging from 0 = I totally disagree to 6 = I totally agree. Cronbach's α was 0.80 for the present data.

2.3.7. Right-Wing Authoritarianism (RWA)

RWA was measured via the German short-scale *Kurzskala Autoritarismus* (KSA-3) by Beierlein, Asbrock, Kauff, and Schmidt [41]. Three items (e.g., We need strong leaders to live secure in society) was answered applying a six-point Likert-scale ranging from 0 = I totally disagree to 6 =I totally agree. Cronbach's α calculation was 0.58 for the present data.

2.3.8. Stress Reactivity

The Perceived Stress Reactivity Scale (PSRS) by Schlotz, Yim, Zoccola, Jansen, and Schulz [42] was used to measure stress reactivity. It contains 23 items, each representing the first part of a statement (e.g., If I have done something wrong ...) that is completed with one of three answering options (... I generally keep my self-confidence/I sometimes become insecure about my abilities/I often question my abilities). Apart from the total scale, five subscales can be calculated. For the present data, Cronbach's α was 0.87.

2.3.9. Strain

Psychological strain was measured with the short version of the Brief Symptom Inventory (BSI) [43]. The comprehensive Global Severity Index (GSI) based on 18 items was used. A four-point Likert- scale ranging from 0 = nothing at all to 4 = very strong was used. Cronbach's α was 0.81 for the GSI.

2.3.10. Perceived Stress Elicited by Children with ADHD

Perceived stress elicited by children with ADHD was measured with the question How severe do you find your stress to be due to the behavior of children with ADHD? That was answered on a VAS ranging from 0 = not severe at all to 6 = very severe

2.4. *Data Analysis*

Data editing (excluding surveys with less than 75% answers per scale, recoding items and calculating scale scores) was followed by descriptive statistical analyses. Subsequently, inference statistical analyses were conducted. Differences in the attitude values towards children with ADHD measured with the ASE and via self-assessment between the three groups pre-service teachers, in-service teachers and PIT were measured via a multivariate analysis of variance (MANOVA).

Latent Profile Analysis

We performed a latent profile analysis (LPA) to identify latent classes of participants who showed a similar response pattern with respect to attitudes towards children with ADHD. Therefore, we used participants' answers on the attitude subscales expectation of positive aspects, expectation of negative aspects, rating of positive aspects, and rating of negative aspects as class indicators. For the LPA, we used z-standardized data due to the different scale formats of the measured latent class indicators.

The default settings of Mplus 8.4 (2019) indicating free estimation of means and variances of the class indicators, constant variances in class indicators between classes, and a covariance set to 0 between indicators within one class were kept. The LPA was conducted for two to eight class solutions, the latter representing high and low values of the examined parameters. The selection of the best class solution was based on the Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC) and sample size-adjusted BIC (ssaBIC), whereupon the class solution with the lowest values should be chosen. In addition, the Lo–Mendell–Rubin likelihood ratio test of model fit (LMR), the Vuong–Lo–Mendell–Rubin likelihood ratio test (VLMRT) [44] and the parametric bootstrapped LRT (BLRT) [45] were taken into account. Considering these tests, the class solution with significant *p*-values should be chosen, as those tests measure whether adding a class improves or worsens the total solution [46]. The entropy value was also included in the choice of a class solution with higher values, indicating more precise assignment of participants to latent classes [47]. The best fitting models were finally compared with respect to the interpretability of their profile structure [48,49].

In the next step, identified profiles were related to different correlates. There are different ways of validly assessing the effects of latent classes on such "distal outcomes". Here, we used the automatic version of the BCH method, in which an ANOVA weighted by the inverse classification error probabilities is calculated [50], to estimate the means of the outcome variables across the different classes [51].

3. Results

3.1. Descriptive Statistics and MANOVA

The descriptive results of the measured variables for all groups are presented in Table 2. The MANOVA revealed a significant difference in attitudes measured with the ASE between the groups of pre-service teachers, in-service teachers and PIT, F (2, 1768) = 4.936, $p = 0.007$. Post-hoc tests showed that PIT had significantly more positive attitudes towards children with ADHD (M = −8.84, SD = 14.45) than in-service teachers ($M = -13.12$, $SD = 14.66$), $p = 0.012$, Cohen's d = 0.294. The MANOVA for the self-assessed attitude also resulted in a significant group difference, F (2, 1768) = 5.678, $p = 0.003$. In this case, post-hoc tests revealed a significantly more negatively perceived attitude of PIT ($M = -0.52$, $SD = 1.65$) than in pre-service teachers ($M = -0.03$, $SD = 1.66$), $p = 0.008$, Cohen's d = −0.296.

3.2. Latent Profile Analysis

The comparison of different LPA solutions indicated a solution with three latent attitude classes as best, as solutions with more classes did not result in significant VLMRT and LMR values while the AIC, BIC and ssaBIC values kept falling. Moreover, the entropy value dropped from the four-class-solution further. Compared to the two-class-solution, the three-class-solution was more differentiated, with profiles that were easier to interpret. The fit indices and class counts for the two- to four-class solution are presented in Table 3. For the three-class solution, the *z*-standardized and original means of the attitude scales are presented in Table 4. The latent profiles are illustrated in Figure 1. Furthermore, the three latent classes' demographics are presented in Table 5. The attitude profiles differed mainly in how positive and negative aspects were rated. Our results suggest that 22% of the participants have a rather *negative rating profile* that is mainly influenced by a negative rating of negative aspects and a negative rating of positive aspects. People in this profile also had the most negative total attitude score compared to the other profiles ($M = 25.80$, $SD = 11.15$). The class with a *moderate rating profile* contained 27% of the participants in our entire sample and obtained the most positive total attitude score ($M = -3.18$, $SD = 11.05$) compared to the other profiles. About half of the participants (52%) showed a rather *extreme rating profile* (total attitude score $M = -10.65$, $SD = 12.46$) with extreme positive and extreme negative ratings.

Table 2. Means and standard deviations of all assessed variables for N = 1794 participants.

Group		Attitude	Perceived Attitude	Knowledge	Use of CMS Total	Use of Effective CMS	Use of Ineffective CMS	Rating Of CMS Total	Rating of Effective CMS	Rating of Ineffective CMS	Perceived Behavioral Control	Subjective Norm
pre-service teachers	*M*	−11.60	−0.03	7.23	0.55	0.72	0.35	0.52	0.73	0.26	2.60	4.65
	SD	13.92	1.66	4.21	0.09	0.12	0.14	0.09	0.13	0.12	1.28	22.50
in-service teachers	*M*	−13.12	−0.20	9.25	0.57	0.74	0.36	0.54	0.76	0.26	2.82	11.03
	SD	14.66	1.68	4.29	0.09	0.13	0.14	0.09	0.14	0.13	1.24	50.22
PIT	*M*	−9.84	−0.52	12.57	0.52	0.81	0.16	0.53	0.82	0.17	3.80	6.39
	SD	14.45	1.65	3.73	0.09	0.11	0.12	0.07	0.09	0.10	0.94	31.59
Total	*M*	−11.93	−0.12	8.23	0.56	0.73	0.34	0.53	0.75	0.26	2.74	6.89
	SD	14.23	1.67	4.45	0.09	0.13	0.15	0.09	0.13	0.13	1.28	34.88

Group		Extraversion	Agreeableness	Conscientiousness	Neuroticism	Openness	SDO	RWA	Stress Reactivity	Strain	Perceived Stress Elicited by Children with ADHD
pre-service teachers	*M*	3.67	3.46	3.71	2.82	3.86	1.12	2.08	20.74	3.75	3.18
	SD	0.71	0.58	0.66	0.73	0.71	0.65	0.90	7.40	0.73	0.98
in-service teachers	*M*	3.89	3.73	3.98	2.60	4.00	1.16	2.09	20.79	3.57	3.28
	SD	0.65	0.52	0.61	0.67	0.65	0.65	0.94	7.46	0.63	1.25
PIT	*M*	3.71	3.83	3.98	2.62	3.97	0.99	1.65	19.31	3.50	4.11
	SD	0.72	0.43	0.57	0.63	0.61	0.57	0.78	6.04	0.41	0.67
Total	*M*	3.75	3.57	3.81	2.74	3.91	1.13	2.06	20.67	3.67	3.27
	SD	0.70	0.57	0.63	0.71	0.69	0.64	0.91	7.35	0.69	1.09

Note: PIT = psychotherapist in training, CMS = classroom management strategies, SDO = social dominance orientation, RWA = right-wing authoritarianism.

Table 3. LPA results based on *N* = 1794 participants' answers on the ASE's attitude subscales expectation of positive aspects, expectation of negative aspects, rating of positive aspects, and rating of negative aspects. Presented are the fit indices as well as the class counts and proportions based on their most likely latent class membership. The best solution is presented in bold.

$N_{classes}$	LogL	AIC	BIC	ssaBIC	VLMRT	LMR	BLRT	Entropy	Class Counts and Proportions			
									Class 1	Class 2	Class 3	Class 4
1	−10,134.896	20,285.793	20,329.730	20,304.315	-	-	-	-	1794 (100%)			
2	−9823.516	19,673.032	19,744.431	19,703.131	<0.01	<0.01	<0.01	0.855	1042 (58%)	752 (42%)		
3	**−9399.986**	**18,835.973**	**18,934.833**	**18,877.648**	**0.002**	**0.003**	**<0.01**	**0.855**	**388 (22%)**	**480 (27%)**	**926 (52%)**	
4	−9239.130	18,524.261	18,650.581	18,577.512	0.450	0.455	<0.01	0.835	519 (29%)	310 (17%)	147 (8%)	818 (46%)

Note: LogL = Log Likelihood; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; ssaBIC = sample size-adjusted BIC; LMR = Lo-Mendell-Rubin likelihood ratio test of model fit; VLMRT = Vuong-Lo-Mendell-Rubin likelihood ratio test; BLRT = parametric bootstrapped LRT.

Table 4. LPA three-class-solution. z-standardized and original means of the ASE's attitude subscales for *N* = 1794.

Class	*n*	Expectation of Positive Aspects		Expectation of Negative Aspects		Rating of Positive Aspects		Rating of Negative Aspects	
		z-Values *M* (*SD*)	Original Values *M* (*SD*)	z-Values *M* (*SD*)	Original Values *M* (*SD*)	z-Values *M* (*SD*)	Original Values *M* (*SD*)	z-Values *M* (*SD*)	Original Values *M* (*SD*)
negative	388	−0.605 (0.833)	0.300 (0.101)	0.412 (0.893)	0.754 (0.100)	−1.429 (0.161)	−1.003 (0.629)	−0.244 (0.639)	−1.816 (0.611)
moderate	480	0.564 (0.833)	0.457 (0.101)	−0.492 (0.893)	0.646 (0.106)	−0.416 (0.161)	0.522 (0.642)	0.975 (0.639)	−0.861 (0.704)
extreme	926	−0.046 (0.833)	0.374 (0.128)	0.088 (0.893)	0.714 (0.113)	0.826 (0.161)	2.381 (0.486)	−0.416 (0.639)	−1.936 (0.524)

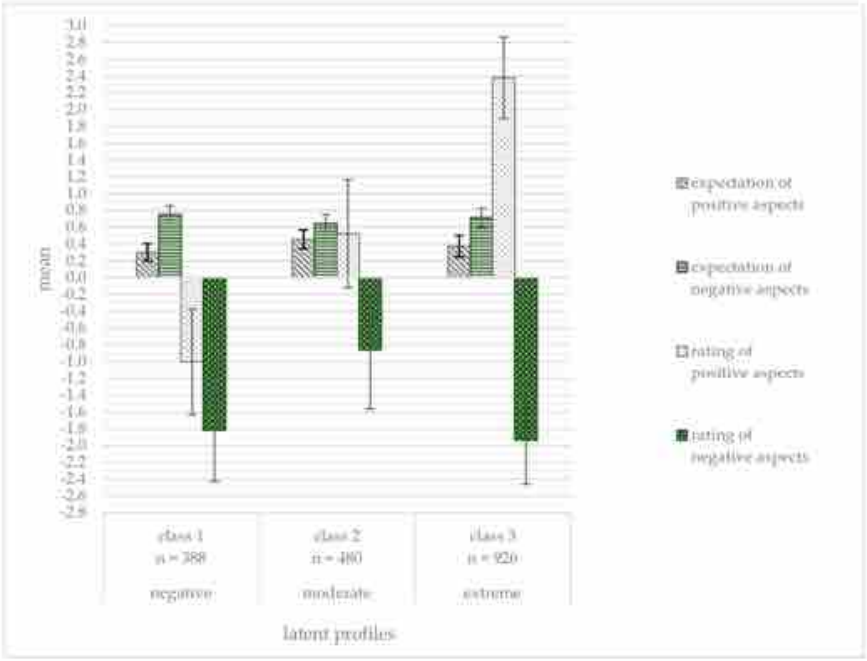

Figure 1. Latent profiles based on N = 1794 participants' answers on the ASE's attitude subscales *expectation of positive aspects*, *expectation of negative aspects*, *rating of positive aspects*, and *rating of negative aspects*. Latent profile analysis was conducted using z-standardized values. Means of the original values are presented to ease comprehension.

Table 5. LPA three-class-solution. Demographics for N = 1794: the proportion of each group (pre-service teachers, in-service teachers or PIT) in a class is shown in brackets first, followed by the proportion of class members compared to the whole group of pre-service teachers, in-service teachers or PIT.

Class	Age *M* (*SD*)	Male	Female	Diverse	Pre-Service Teachers	in-Service Teachers	PIT
negative	31.48 (12.10)	24%	76%	0.3%	210 (54%/19%)	159 (41%/27%)	19 (5%/17%)
moderate	30.45 (11.02)	30%	70%	0%	290 (60%/27%)	163 (34%/27%)	27 (6%/25%)
extreme	28.64 (9.81)	24%	76%	0.4%	586 (63%/54%)	277 (30%/46%)	63 (7%/58%)

Note: PIT = psychotherapists in training.

Aside from their attitude profiles, the latent classes also differed significantly in several other variables. In Table 6, we listed the significant differences according to the BCH-method. For better traceability, the original values are reported. Corresponding z-values are found in the Supplementary Material.

Table 6. LPA three-class-solution. Significant differences in auxiliary variables between classes according to the BCH method. Presented are original means and standard deviations for the variables for $N = 1794$. In a second row corresponding Cohen's |*d*|values for significant group differences are presented.

Class	Perceived Attitude	Knowledge	Perceived Behavioral Control	Perceived Stress	Use Ineffective CMS	Rating Effective CMS	Rating Ineffective CMS	SDO	RWA	Stress Reactivity	Extra-Version
negative [a]	−0.57 (1.67) [bc]	8.65 (4.43) [b]	2.57 (1.32) [b]	3.53 (1.07) [bc]	0.37 (0.16) [bc]	0.72 (0.15) [bc]	0.26 (0.14) [bc]	1.23 (0.68) [c]	2.24 (0.99) [bc]	21.56 (8.05) [b]	3.81 (0.71) [c]
moderate [b]	0.51 (1.56) [ac]	7.17 (4.56) [ac]	3.00 (1.18) [ac]	3.01 (1.08) [ac]	0.33 (0.14) [a]	0.74 (0.13) [ac]	0.28 (0.14) [ac]	1.18 (0.64) [c]	1.97 (0.93) [a]	19.51 (7.15) [ac]	3.79 (0.69) [c]
extreme [c]	−0.25 (1.63) [ab]	8.59 (4.37) [b]	2.67 (1.29) [b]	3.30 (1.07) [ab]	0.34 (0.14) [a]	0.76 (0.12) [ab]	0.24 (0.12) [ab]	1.06 (0.62) [ab]	2.03 (0.86) [a]	20.90 (7.08) [b]	3.69 (0.69) [ab]

	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
negative [a]	-	0.7	0.2	-	0.3		-	0.3	0.3	-	0.5	0.2	-	0.3	0.2	-	0.1	0.3	-	0.1	0.2	-		0.3	-	0.3	0.2	-	0.3		-		0.2
moderate [b]	0.7	-	0.5	0.3	-	0.3	0.3	-		0.5	-	0.3	0.3	-		0.1	-	0.2	0.1	-	0.3		-		0.2	0.3	-		0.3	-	0.2	-	0.1
extreme [c]	0.2	0.5	-		0.3	-	0.3		-	0.2	0.3	-	0.2		-	0.3	0.2	-	0.2	0.3	-	0.3	0.2	-	0.2		-		0.2	-	0.2	0.1	-

Note: Superscripts are assigned to the classes. A superscript indicates that the result of the class in this line differs significantly from the class the superscripts belongs to. The second row shows the Cohne's |*d*| values for significant differences between the classes regarding the variable that is labeled in the first line of the first row. The labels of the classes are in the first line of the second row presented by the assigned superscripts. CMS = classroom management strategies, SDO = social dominance orientation, RWA = right-wing authoritarianism.

In summary, the LPA revealed three different attitude profiles. The first attitude profile (class 1) showed a negative rating profile that coincided with the worst ASE and perceived attitude scores, highest perceived stress due to children with ADHD, most frequent use of ineffective CMS, lowest effectiveness rating of effective CMS, and the highest RWA scores compared to the other profiles. The second attitude profile (class 2) was characterized by a moderate rating profile. That profile had the best ASE and perceived attitude score, lowest knowledge about ADHD, most perceived control, lowest perceived stress, highest effectiveness rating of ineffective CMS, lowest stress-reactivity and highest proportion of male participants in comparison to the other profiles. The third attitude profile (class 3) turned out to have an extreme rating profile. Their profile had a more negative perceived attitude than the second did, but a more positive perceived attitude than the first profile. Additionally, this profile was characterized by stress perceived to be moderate, the highest effectiveness rating of effective and the lowest effectiveness rating of ineffective CMS, the lowest SDO and extraversion scores, as well as younger participants compared to the other profiles. Note that this attitude profile added more weight to the positive aspects' rating than to the rating of negative aspects.

4. Discussion

A professional's attitude can have a profound impact on children with ADHD, as this attitude can influence the professional's behavior [18,20] which can, in turn, affect the child's severity of ADHD symptoms, their work habits, and social processes [6–9]. Thus, we wanted to identify different attitude profiles and to investigate which ones would prove desirable for professionals working with children with ADHD. We therefore examined the attitudes of teachers in service, in training, as well as PITs, representing groups frequently working with children with ADHD.

4.1. Differences between PITs and Teachers

First, we assumed PITs would have a more positive attitude towards children with ADHD than teachers. Our study results support this hypothesis, as the PITs' attitude score measured via the ASE was more positive than the in-service teachers' score. However, the comparison of perceived attitude also revealed that PITs tend to have the most negative score (followed by in-service teachers), differing significantly from pre-service teachers. One explanation for this result might be that PITs are more realistic, have had more actual contacts with children with ADHD, or are more self-critical, especially compared to pre-service teachers. Another reason for this appraisal could be the frame of reference, as the question was not specific in this regard. Participants could on the one hand have referred to inter-individual differences, comparing their attitude with that of others. On the other hand, they could have focused on intra-individual differences by comparing their attitude towards children with ADHD with their attitude towards other children. Correspondingly, PITs might have compared their attitude towards children with ADHD more intra-individually and not taken their probably rather general positive attitude towards "problematic" children that much into account.

4.2. Attitude Profiles

Investigating the variable attitude more precisely with an LPA based on the participants response pattern on the ASE's attitude subscales *expectation of positive aspects*, *expectation of negative aspects*, *rating of positive aspects*, and *rating of negative aspects*, we extracted three different attitude profiles that differ mainly in the rating of positive and negative aspects, but not in their expectation. This fact underlines that when examining attitude, it is very important to let participants rate aspects individually and to assess different nuances of positive and negative ratings, as the ASE suggests [36]. Thus, solely asking for (dis-)agreement with statements, as many instruments did before [52,53], will probably ignore existing differences in attitude. Moreover, difference between the identified attitude profiles in knowledge, perceived behavioral control, use and rating of CMS and stress related variables were found. Regarding personality, only SDO, RWA, and extraversion showed a potential influence, though extraversion had the lowest effect. This indicates that only very specific facets of personality

concerning hierarchies and prejudices seem to play a role in this context. Most effect sizes of the differences between the identified attitude profiles were rather small, but can help to characterize the members of the attitude profile classes.

The first attitude profile is characterized by a negative rating style, as both negative and positive aspects tended to be rated rather negatively. This result illustrates that VAS has a possible advantage, as such scales do not reveal a visual division and therefore might facilitate the assessment of a participant's opinion more implicitly than Likert scales, for example. The first attitude profile's tendency to rate negatively is also apparent, considering the effectiveness rating of effective CMS. Participants with the negative rating profile report the lowest effectiveness rating in this regard compared to the other profiles. Furthermore, compared to the others, participants with the negative rating profile report the highest use of ineffective CMS. As these CMS do not help manage children's ADHD symptoms adequately [9,54], it is not surprising that participants with this profile also report the highest perceived stress from children with ADHD compared to the other profiles. This negative experience might facilitate negative expectations, representing one part of their attitude [17,21]. Thus, this profile, compared to the others, accompanies the lowest attitude score measured by the ASE. Participants with the negative rating profile also had the highest RWA scores compared to the others. This finding concurs with the assumption that people with higher RWA scores also have more prejudices against other groups and minorities [55].

The second attitude profile reveals a rather moderate rating style with slightly stronger ratings of negative than of positive aspects. This corresponds with the most strongly perceived control and lowest perceived stress due to children with ADHD compared to the other profiles. However, participants with this profile also have the least knowledge about ADHD, and delivered the highest effectiveness ratings of ineffective CMS compared to the other participants. Furthermore, participants with this profile obtained the highest ASE-measured attitude score, the best self-perceived attitude, and the highest perceived control compared to the other profiles. High-perceived control and low-perceived stress combined with low knowledge could indicate that participants with this profile probably feel that they are able to handle children in general. Another potential interpretation of this profile is that participants with this profile are somewhat uninvolved and do not attach too much value to classroom or therapeutic situations. If so, children with ADHD would not be likely to affect them much—either negatively or positively.

The third attitude profile exhibits rather extreme ratings of positive and negative aspects. Moreover, it places more weight on positive than on negative aspects. Participants with this profile reported the highest effectiveness ratings of effective, and lowest of ineffective CMS compared to the other participants. They also reported moderate perceived stress and a moderate negative attitude towards children with ADHD compared to the other groups. This result may indicate that this profile represents quite realistic participants who are able to evaluate CMS correctly and acknowledge the effort that working with children with ADHD demands. Having the lowest SDO scores compared to the other participants indicates that participants with the extreme rating profile prefer flat to hierarchical structures [39]. The lower extraversion score than those of participants with other attitude profiles reflects this, as extraversion incorporates characteristics such as being dominant or authoritative [56]. This result could imply greater willingness to work with children on an equal level.

4.3. Desirable Profile for Professionals Working with Children with ADHD

Now, the question is which of the profiles we identified is most desirable for professionals who work with children with ADHD. As things stand now, we feel compelled to say that it depends on one's perspective. Obviously, the negative rating profile does not seem beneficial for either professional group, as people in this class experience a lot of stress, and children with ADHD have a rather bad reputation in this group. Nevertheless, this profile covered 27% of all in-service teachers and 19% of all pre-service teachers, as well as 17% of all PITs.

The moderate rating profile might be more desirable, as participants with this profile are the only ones with a positive-perceived attitude towards children with ADHD, and they have the best ASE-measured attitude score. As participants with this profile also have a lower stress reactivity compared to the other profiles, they seem to be less stressed by children's (mis-)behavior, the relationship between them and children with ADHD is probably not particularly negative. Moreover, high-perceived behavioral control and low-perceived stress indicate a certain degree of comfort on the part of the professionals. Thus, they might find that being rather relaxed and not very affected by classroom or therapeutic situations is quite comfortable for them and not the worst for children with ADHD. Especially for subject teachers who are less often in contact with their students (or who do not see them for long periods, as in music or art for example), this attitude profile might be favorable. Overall, 27% of all in-service and pre-service teachers and 25% of all PITs were assigned to this profile.

Nevertheless, when focusing on children with ADHD, the extreme rating profile might be preferable, as it is accompanied by more knowledge about ADHD and more correct effectiveness ratings of CMS. The latter appeared to be an important factor influencing the use of effective CMS [25], which again reduces the severity of ADHD symptoms [9]. Combined with the professionals' quite realistic perspective and probably greater involvement, we believe that children with ADHD could profit from this attitude profile. A model analysis also showed that some feeling of stress seems to be conducive to the intention to use effective CMS [27]. Aside from that, the extreme rating profile weighs positive aspects more than negative ones, giving children with ADHD the opportunity to compensate for ADHD-related behavioral problems. The increased probability of using effective CMS and reducing ADHD symptoms can also affect professionals positively. Notably, for teachers in close contact with their students (e.g., main subject or class teachers) this profile's characteristics might be advantageous. Unfortunately, not even half of all these in-service teachers (46%) demonstrated this profile, whereas 54% of all pre-service teachers and 58% of all PITs did.

In summary, our findings highlight the advantage of an LPA over a single examination of attitudes, as the highest attitude score does not necessarily reflect the most beneficial handling of ADHD symptoms.

4.4. Implications

The present study findings reveal that nearly a third, a relatively large proportion, of in-service teachers tend to have an attitude profile that can be considered a negative rating profile. This profile has disadvantages for both the professionals themselves and for children with ADHD. Accordingly, it would be important to support professionals with such characteristics in modifying their perspective to improve their collaboration with children with ADHD. Furthermore, it would be interesting if this attitude profile is specific to children with ADHD, or if it applies to children in general. Our working group is currently investigating this point.

Our comparison of the moderate and extreme rating profile reveals the flexibility in handling children with ADHD, as both profiles have their advantages and disadvantages. This fact should be taken into account when trying to convince professionals to implement effective CMS, as some might not perceive a major advantage by doing so. Additionally, this result illustrates the relevance of the professionals' degree of involvement and occupation with and knowledge about the topic of ADHD, and thereby explains why the attitude score itself influences the use of effective CMS only conditionally [25]. Hence, future studies should also assess the degree of involvement. It would also be interesting to discover whether professionals with a moderate rating profile can be encouraged to use effective CMS after knowledge transfer, as they have demonstrated the least knowledge about ADHD to date.

4.5. Limitations

A limitation is the small proportion of PITs in the present sample, although compared to the groups' distribution in the general population, it is still rather high. The heterogeneity of the groups

and the demographic differences can also play an important role. In the present study, they were not further analyzed, as they can be seen as fixed and not modifiable.

Second, the extent of experience one can assume when examining pre-service teachers, in-service teachers and PITs is very heterogeneous. To investigate the role of this variable more precisely, it is necessary to assess not just how many years on the job or how many children with ADHD a person has worked with, but also the intensity of those collaborations. That would include the frequency and time period of contacts, and the duration of such contacts in this time period. Future studies should take this into account. Considering contacts of professionals and children with ADHD, the school lessons and therapeutic sessions differ, especially with regard to the number of children that are in one room at the same time. Thus, future studies should focus on one group to examine questions that are more specific. We did so in conducting model analyses for the intention to use effective CMS separately for pre- and in-service teachers [25,27].

Third, online surveys are biased with respect to participants. The dissemination of the link via Facebook groups and email lists reaches only a limited group of people and the truth of the answers cannot be ensured. Besides, professionals with strong negative attitudes towards children with ADHD might not even be willing to participate in such a study. On the other hand, these professionals might be especially keen to take this opportunity to express their opinion. Then again, professionals with a moderate attitude may find an investigation of this topic irrelevant, and would therefore not take part in such a survey. It would thus be beneficial to have a more representative sample—such as all teachers from a selection of schools. Nevertheless, online surveys enable us to collect a large amount of data, and we tried to compensate for any bias by using an attractive incentive.

Addressing the two previous points, it would be interesting to investigate whether differences between professionals working with younger children compared to adolescents can be found. As mentioned above, the current study aimed to provide a first general overview of professionals' attitudes towards children with ADHD. Considering potential age influences of the children on the professionals' attitudes would have been interesting to investigate, though we could not satisfactorily group the different professionals according to children's' age, and thus had to refrain from such an analysis as the different range of ages of the children (sub) groups in this sample would have made clear categorization of the children's age difficult. Studies focusing on a specific age group would improve on this.

Furthermore, the present results only enable us to estimate the influence of these various attitude profiles on children with ADHD and their perception thereof. It would be interesting to find out which of these attitude profiles children with ADHD actually favor.

Another limitation of the current study are the relatively low internal consistencies of the subjective norm, Big Five agreeableness, and right wing authoritarianism ratings. This limits the explanatory power of the results. The use of short versions of those scales might be an explanation for these low values, as Cronbach's alpha depends on the length of a scale. This problem is a result of the attempt to make a complex survey with many variables that is still compact, so that not too many participants drop out during completing it.

5. Conclusions

The present study examined teachers' and PITs' attitudes towards children with ADHD and identified three different attitude profiles that are characterized by negative, moderate and extreme ratings of expectations towards children with ADHD. It further illustrates that an extreme rating profile might be favorable for children with ADHD, as well as for professionals in close contact with such children. Nevertheless, a moderate rating profile that seems to be related to a somewhat uninvolved mindset might also be of benefit for some professionals. This fact needs to be considered when trying to create a comfortable, more pleasant working environment for children with ADHD and the professionals working with them.

Supplementary Materials: The following are available online at http://www.mdpi.com/2071-1050/12/22/9691/s1, BCH-method results z-values.

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7.4 Studie 4

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Influences on pre-service teachers' intention to use classroom management strategies for students with ADHD: A model analysis☆

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ABSTRACT

Students with ADHD often feel mistreated at school, receive low grades, and can have low socioeconomic statuses as adults. Evidenced-based classroom management strategies (CMS) are effective in minimizing ADHD-related issues in schools, but have not found their way into practice. 1086 pre-service teachers completed an online survey on direct experiences, social influences, individual differences, attitude, and intention to use CMS. We examined which variables mostly influenced the intention to use CMS. Pre-service teachers' attitude towards CMS was the most important influencing factor, and knowledge most significantly influenced attitudes towards CMS. Attitude towards CMS need to be changed to increase the probability pre-service teachers will use effective CMS. Additionally, education for teachers should include information on CMS.

1. Introduction

"The vice-principal even said straight to me 'You look like that possessed kid from *The Exorcist.*" This is a quote from an interview with a child with attention deficit/hyperactivity disorder (ADHD) (Honkasilta, Vehkakoski, & Vehmas, 2016), impressively illustrating the difficult relationship students with ADHD often have with their teachers, as well as the negative generalized expectations they often face. Students with ADHD often feel misunderstood and treated unfairly, and their teachers feel overwhelmed by increasing classroom stressors and a lack of knowledge needed to deal with students' behavior (Greene, Beszterczey, Katzenstein, Park, & Goring, 2016; Honkasilta et al., 2016). Children with ADHD also have positive experiences, such as supporting teacher behavior (Honkasilta et al., 2016). This implies there are individual differences in how teachers interact with students with ADHD, which can be linked to their use of classroom management strategies (CMS) (Clunies-Ross, Little, & Kienhuis, 2008). Generally, effective and ineffective CMS can be distinguished. Effective ones are antecedent - based, (e.g. setting classroom rules, modifying tasks) and consequent - based, (e.g. using a token plan or use reprimands, or self-management strategies, with which the student is able to monitor its own behavior) (Gaastra, Groen, Tucha, & Tucha, 2016). In a German survey only about 48 % of the teachers' mentioned strategies to handle ADHD in the classroom were classified as effective ones, though (Ruhmland & Christiansen, 2017). Ineffective CMS are by far used more often and based on coercing and punishment (e.g. shouting at students with ADHD, sending the student out of the room with no comment, or telling the student that he/she should behave or concentrate better) (Hoberg, 2013). Although impressive evidence supports positive CMS as effective in preventing and addressing students' symptoms of ADHD, including disruptive behavior, in the classroom (Barkley et al., 2000; Christiansen, Hirsch, König, Steinmayr, & Roehrle, 2015; Gaastra et al., 2016;

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Miranda, Presentación, & Soriano, 2016), their use in practice is rare (Ruhmland & Christiansen, 2017). Instead, ineffective CMS are reported to be used by far more often (Ruhmland & Christiansen, 2017). This implies a science-practitioner gap where the current state of research does not find its way into the classroom. Hence, the aim of the present study is to detect relevant factors impacting teachers' intentions to use CMS to help work towards closing this gap. Our second aim is to identify factors influencing teachers' intentions to use ineffective CMS in order to reduce the usage of ineffective CMS. We conducted our study based on a large sample of pre-service teachers.

1.1. Expectations and attitudes

Teachers often have generalized expectations regarding ADHD, which can influence their behavior towards students diagnosed with the disorder (Ohan, Visser, Strain, & Allen, 2011). Expectations, as defined by Rief et al. (2015) in the *violation-expectation model* (ViolEx) propose "if-X-then-Y" sequences that emerge from learning processes, in which a unique situation, "X," (e.g., using CMS for a misbehaving student) leads to the anticipation of a unique response "Y," (e.g., CMS will not work and student will be strenuous). If "Y" does not happen (CMS works and student behaves positively), expectations are violated. This might result in three different general responses: 1) accommodation, in which case learning takes place and students with ADHD might be viewed more differentially; 2) assimilation and 3) immunization - in both cases no learning takes place, as the unexpected information will be discarded (Rief et al., 2015). In case of assimilation individuals actively remove any discrepancies between their generalized expectations and expectation inconsistent outcomes without changing their expectations. For instance, people avoid expectation inconsistent outcomes in the future and/or contribute actively to a higher likelihood of expectation consistent outcomes in the future (i.e., "self-fulfilling prophecy," Miller & Turnbull, 1986; Stinson, Logel, Shepherd, & Zanna, 2011, "active inference," Friston, 2009; Hechler, Endres, & Thorwart, 2016). In case of immunization individuals minimize the potential impact of discrepant information on their expectations (e.g. "that the child behaved positively was an exception"). The latter is confirmed by studies from social psychology demonstrating that confronting people with stereotype inconsistent information does not necessarily change their stereotypes, but leads to the judgement that this information is an atypical fact and can thus be ignored (Carnaghi & Yzerbyt, 2007; Kunda & Oleson, 1995).

Significant variables, such as direct experiences, social influences, and individual differences, influence the mechanisms of "if X then Y" sequences in the ViolEx model. As we use the ViolEx model as a framework of the described and assumed science-practitioner gap in using evidence-based effective CMS for students with ADHD we consider the variables generalized expectations, direct experiences, social influences, and individual differences.

According to Ajzen (2005), generalized expectations towards CMS can be measured as behavioral attitude and are influencing behavior. For instance, research showed that a teacher's attitude towards inclusion is a relevant factor that changes a teacher's intention to support inclusion (Lübke, Meyer & Christiansen, 2016). Ajzen (2005) determined that *attitude* can be categorized as either attitude towards an object (e. g. students with ADHD) or attitude towards behavior related to an object (e.g. attitude towards CMS' usage). The first consists of expectations regarding cognition and affect towards the attitudes' object and the individual subjective evaluation of those. The second is *behavioral attitude*, and it would most likely influence a teacher's intention to use CMS. It can be measured as the expected probability a behavior will have consequences, multiplied by the subjective evaluation of the consequences (e.g., CMS will be effective in reducing the disruptive behavior of students with ADHD). Therefore, behavioral attitude comprises the "If X than Y" sequences and makes them measurable. Additionally, three other factors may affect a teacher's intention to use CMS: attitude towards students with ADHD, perceived behavioral control, and subjective norms, as defined by the *theory of planned behavior* (TPB; Ajzen, 1991).

According to the TPB, human behavior is influenced directly by the intention to execute a behavior and by perceived behavioral control. Intention itself is, in turn, influenced by perceived behavioral control, subjective norms, and attitudes towards a behavior (Ajzen, 1991). *Intention* is the motivation behind a behavior. The teachers' *behavior* in our understanding would be to implement an effective/ineffective CMS. *Perceived behavioral control* is one's ability to handle a specific situation (e.g. I will be able to handle a strenuous student). The *subjective norm* is one's motivation to meet the expectations of a relevant group regarding a behavior (e.g. the headmaster expects me to handle my classroom well) (Ajzen, 1991, 2005). In the present study, we focused on the influence of intentions to identify the most important variables affecting teachers' intentions to use CMS. In Fig. 1 the theory of planned behavior (Ajzen, 1991) and the violation expectation model (Rief et al., 2015) and its usability to assess teachers' intention to use CMS are summed up.

1.2. Direct experiences

Generalized expectations and therefore also the attitude are largely influenced by direct experiences (Rief et al., 2015). ADHD-related behavior in classrooms, such as inattention, impulsivity, and hyperactivity, can be difficult to handle. Compared to other students, teachers can feel significantly more stressed by students with ADHD (Greene et al., 2016). Furthermore, pre-service teachers that are defined in our study as education majors, that are not or not regularly teaching, generally show a more favorable response to students with ADHD than experienced in-service teachers (Anderson, Watt, Noble, & Shanley, 2012). Hence, teachers may often have negative experiences with, as well as stress from students with ADHD, leading teachers to expect further negative interactions with these students. Thus, it is important to understand how much of teachers' stress is due to the classroom behavior of students with ADHD, as this may negatively influence teachers' attitudes towards, and intentions to use, CMS.

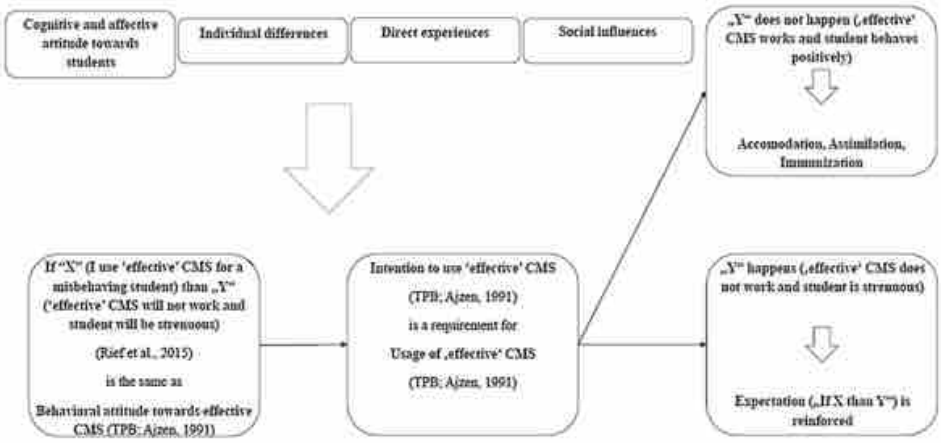

Fig. 1. Expectations ("If X than Y") influence the usage of classroom management strategies (CMS). Because of individual differences, direct experiences, social influences and the attitude towards students with ADHD a specific expectation (If X [I use 'effective' CMS for a misbehaving student] than Y ['effective' CMS will not work and student will be strenuous]) is built. In a specific situation the expectation is activated and the intention to use effective CMS is minimized. However, if it did come to a usage of effective CMS two things could happen. If the assumption "Y" ('effective' CMS does not work and student is strenuous) holds true, the expectation ("If X than Y") is reinforced. If "Y" does not hold true and the 'effective' CMS works and students behaves positively three possible mechanisms (accommodation, assimilation, immunization) might happen and it comes either to a change in the "If X than Y" sequences or not.

1.3. Social influences

Social experiences shape expectations and therefore also the attitude through contact and communication with peer groups about the sometimes-implicit knowledge of people around them (Rief et al., 2015). From this knowledge, individuals often act in a way that generalized expectations create a social reality and thus self-confirm (Jussim, 2012; Rief et al., 2015). Prejudices, stereotypes, and widespread opinions about other groups are the expression of generalized expectations and an important factor in the decision process (Rief et al., 2015). Previous findings showed that teachers' affects towards students with ADHD are often negative (Anderson et al., 2012; Mulholland, Cumming, & Jung, 2015), and students with a diagnosis of ADHD were rated as worse academically and more impaired than comparable children demonstrating the same behavior, but without the diagnostic label of ADHD (Ohan et al., 2011). Furthermore, teachers have described reduced confidence in their abilities to handle students with ADHD (Ohan et al., 2011). Subjective norm in the context of the TPB measures teachers' socially shared knowledge but also their willingness to meet social norms (Ajzen, 2005).

1.4. Individual differences

Frequently experiencing stress can lead to increased mental health issues for teachers, as evidenced by research showing teachers have a significantly increased risk of developing somatization disorder (Howard et al., 2017) or depressive symptoms (Hammen & DeMayo, 1982). Feelings of stress and psychological strain teachers experienced directly were linked to declines in classroom engagement and teacher-student relationships (Hakanen, Bakker, & Schaufeli, 2006; Yoon, 2002).

Perceived behavioral control, as mentioned in the TPB influences not only the intention to execute a behavior, but also the attitude towards a behavior (Ajzen, 1991).

Research shows expectations and therefore also the attitude are influenced by different personality traits, and in the TPB, Ajzen and Fishbein (2005) described personality factors as influencing variables of attitude. Ekehammar, Akrami, Gylje, and Zakrisson (2004) showed that *right-wing-authoritarianism* (RWA), *social dominance orientation* (SDO), and the big five personality traits matter most in predicting prejudices. Therefore, we focused on those variables. The concept of "the authoritarian personality," was constructed to examine why some people have prejudices towards minorities rather than others (Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). This concept was later revised to be RWA and measures a liableness to fascist ideologies (Altemeyer, 1981, 1998). SDO was first introduced by Pratto, Sidanius, Stallworth, and Malle (1994), and refers to a perspective in which one has a preference for hierarchical societal structures over more equal ones.

The "Big Five" refers to five personality dimensions (*openness, conscientiousness, extraversion, agreeableness, neuroticism*) that describe differences in personality cross-culturally, and have a shaping function regarding expectations and therefore also the attitude (DeYoung, 2015; Ekehammar et al., 2004).

Stress Reactivity represents our vulnerability in reacting to stressful events. Stress reactivity can explain the varying stress levels of different people in same situations (Schulz, Jansen, & Schlotz, 2005). People with a high level of stress reactivity have inter alia a

decreased concept of their abilities and difficulties in setting new goals for themselves (Schulz et al., 2005), which directly influences their expectations and therefore also the attitude towards CMS.

As part of the individual differences outlined above, teachers' *knowledge* about ADHD has been identified as an additional factor influencing their expectations and therefore their attitude (Bekle, 2004). Several studies demonstrated that teachers often do not have accurate knowledge on ADHD, and this is linked to more coercive teaching behavior, which can aggravate students' behavior problems (Rufumland & Christiansen, 2017; Schmiedeler, 2013; Soroa, Gorostiaga, & Balluerka, 2016). Teachers' lack of knowledge about ADHD is especially pronounced regarding treatment opportunities and the prevalence of the disorder (Bekle, 2004; Kos, Richdale, & Hay, 2006; Sciutto, Terjesen, & Frank, 2000).

1.5. Research questions

In this study, we explore pre-service teachers' behavioral attitudes as a proxy for their generalized expectations. As these influence the intention to either use effective or ineffective CMS, we focus on factors that were identified as relevant: direct experiences, social influences, and individual differences. To improve our understanding of the science-practitioner gap, including its potential causes and why some teachers may cope better with students with ADHD than others, we aimed to determine what variables shape, and to what extent, both attitudes towards, and intentions to use, CMS. Knowledge on influencing variables shaping pre-service teachers' intention to use effective or ineffective CMS lead to implications for teacher education as well for further research. Implementing more effective and less ineffective CMS for students with ADHD leads to reduced impairment of children with ADHD, a higher equality of opportunities for students with ADHD and makes best use of teachers' potential.

The following research questions are explored:

1 Can the intention to use effective CMS be explained by pre-service teachers' behavioral attitude towards effective CMS as well as through individual differences, direct experiences, social influences, and their attitude towards students with ADHD?
2 Are all variables that influence behavioral attitude towards effective CMS also influencing the intention to use effective CMS mediated through behavioral attitude towards effective CMS?
3 Can the intention to use ineffective CMS be explained by pre-service teachers' behavioral attitude towards ineffective CMS as well as through individual differences, direct experiences, social influences, and their attitude towards students with ADHD?
4 Are all variables that influence behavioral attitude towards ineffective CMS also influencing the intention to use ineffective CMS mediated through behavioral attitude towards ineffective CMS?

2. Methods

2.1. Sample population

Using the online tool *SoSciSurvey* (https://www.soscisurvey.de/), we conducted the present study with pre-service teachers from all over Germany. The sample population included 1086 participants (n = 1086). A total of 1741 pre-service teachers (n = 1741) started the survey, and 1118 completed it (n = 1118). Consequently, the dropout rate for the survey was 35.78 %. Furthermore, 2.86 % (n = 32) of the participants were excluded from the analysis, because they completed less than 75 % of at least one scale. The mean age of the participants was 23.22 years (SD = 3.93), and 30.57 % were male, 68.97 % were female, and 0.46 % identified as another gender, not further specified. Table 1 lists the participants' schools they were prepared to teach for. Predominantly, academic high school pre-service teachers participated in the survey.

2.2. Procedure and sequence of the survey

The study adopted a cross-sectional, non-experimental design to test the suggested variables. We sent the link leading to the survey via e-mail to universities with the request it be passed on to their students. Furthermore, the link was distributed in Facebook groups for pre-service teachers. The subject lines of the e-mail and the Facebook posts included information regarding possible prizes for the participation, to be awarded via raffle. It was possible to win a Nintendo Switch (approximate value 300 euros) or one of three

Table 1
Pre-service teachers' current course of study. The percentages can be more than 100, because more than one program can be studied at a time.

School type	%	Number (absolute)
Primary school (Grundschule)	27.72	301
Comprehensive school (Gesamtschule)	7.32	80
Main school (Hauptschule)	9.12	99
Middle school (Realschule)	16.30	177
Academic high school (Gymnasium)	45.03	489
Special needs school (Förderschule)	10.04	109
Other (Sonstige)	2.39	26

gift certificates, with a value of 50 euros each. The survey included detailed information on the purpose of the study, which was also described briefly in the e-mail and the Facebook posts. The survey started in November 2017, and was available for five weeks, with a reminder sent to the universities after three weeks. After clicking on the link, all participants received detailed study information and were asked to provide informed consent. This was followed by questions on participants' age, gender, and course of study, and an open-ended question on their estimation regarding the average number of students with ADHD per classroom. At the end of the survey, all participants were asked whether they wanted to receive further information on the study and if they would like to take part in the raffle. If they decided to choose one or both of those options, they were asked to provide their e-mail addresses, which were saved separately from the survey data.

2.3. Measures

2.3.1. Intention to use CMS

To measure the intended use of effective and ineffective CMS the intervention section of the ADHD School Expectation Questionnaire (ASE) was used (Dort et al., under revision). The ASE consists of a knowledge, an intervention, and an attitude scale and was validated with pre-service and in-service teachers. Construct validity and reliability are overall satisfactory (Dort et al., under revision). The intervention scale consists of 15 effective and twelve ineffective interventions, which were selected by reviewing previous findings (Dupaul, Eckert, & Vilardo, 2012; Miranda et al., 2016). The respondent is required to estimate how often he/she would use the intervention. For example, items of effective CMS are *"Use a reward system"* or *"Behavior related praise as often as possible"*. Items representing ineffective CMS are *"Tell the student to behave better"* or *"Banish the student from the classroom with no comment"*. The assessment of the ASE is based on a twelve-point Visual Analogue Scale (VAS) ranging from *never* to *very often*. It was transformed afterwards into an interval scale from zero to one. The scale was divided into subscales for either effective (15 items) or ineffective (twelve items) CMS. Cronbach's $\alpha = .80$ for the effective CMS scale ($M = .72$, $SD = .12$), $\alpha = .79$ ($M = .35$, $SD = .14$) for the ineffective CMS scale, and $\alpha = .73$ ($M = .55$, $SD = .09$) for the total scale.

2.3.2. Generalized expectations: Attitude with affective, cognitive, and behavioral components

Affective and cognitive attitudes towards students with ADHD were measured using the ASE(Dort et al., under revision). It comprises thirty-three items on attitudes towards students with ADHD. The scale measuring the cognitive attitude component addresses behavior that is expected of students with ADHD (27 items) and the rater indicates whether this behavior is *likely* or *unlikely* (coded from 0 to 1) as well as *negative* or *positive* (coded from -3 to +3). The two ratings were multiplied as two components and added together afterwards constituting one joint measurement of attitude, in reference to Ajzen (1991). Sample items are *"Loses school material"*, *"Can concentrate"*, *"Avoids tasks that demand attention."* Affective attitude was equally measured by requesting for ratings of potential emotions a (pre-service) teacher may feel towards students with ADHD (six items). The queried emotions were among others *"joy"* and *"anger."* Cronbach's $\alpha = .87$ ($M = -11.66$, $SD = 13.92$) for the attitude scale.

The behavioral component of the attitude scale comprises twenty-seven CMS that can be used in the classroom to reduce disruptive behavior (e.g. *"Short, concise instructions."*), and is rated on a VAS ranging between *not effective at all* and *very effective*. For the effective CMS' subscale Cronbach's $\alpha = .82$ ($M = .73$, $SD = .13$), for the ineffective CMS' subscale Cronbach's $\alpha = .74$ ($M = .52$, $SD = .09$), and for the total scale Cronbach's $\alpha = .73$ ($M = .26$, $SD = .12$ scale.

2.3.3. Direct experiences

2.3.3.1. Stress. One item ("How high do you estimate your stress will be from the behavior of students with ADHD in the classroom?") assessed expected individual stress levels caused by students with ADHD. This was rated on a VAS ranging from *not at all* to *very massive*. The mean of the item was $M = 3.18$, with answers ranging from zero to five, with a standard deviation of $SD = 0.98$.

2.3.4. Social influences

2.3.4.1. Subjective norms. Six items on subjective norms were constructed based on the TPB (2002b, Ajzen, 2002a) assessed with a VAS ranging from *I totally disagree* to *I totally agree*, that was transformed to range from zero to five. Those six items resulted in an unsatisfactory Cronbach's α of .32 ($M = 2.90$, $SD = 0.63$). We shortened the scale to improve Cronbach's α (e.g. items with discriminatory power below .30 were eliminated; Blanz, 2015); this resulted in $\alpha = .52$ ($M = 3.12$, $SD = .98$). The items are *"I want people who are important to me to think well of me "*, *"Doing something that I know others consider as unethical, makes me lose my self-esteem"*, and *"I do not care if other people have a bad opinion on me."*

2.3.5. Individual differences

2.3.5.1. Psychological strain. Psychological strain was measured using the Brief Symptom Inventory (BSI) (Franke, 2000). The BSI consists of fifty-three items grouped into nine scales, which form three global characteristics: Global Severity Index (GSI), Positive Symptom Distress Index, and Positive Symptom Total. GSI measures mental strain in general, and this index was used to identify the level of psychological stress for pre-service teachers. A sample item is *"How much have you suffered from nervousness or tremors in the past seven days?."* A four-point Likert-type scale ranging from *nothing at all* to *very strong* was used. Franke (2000) reported a Cronbach's $\alpha = .95$ for the GSI, and in the present study it was $\alpha = .91$ ($M = 1.25$; $SD = 0.2$).

2.3.5.2. Perceived behavioral control. Two items were generated to measure perceived behavioral control. Item compilation was based on the specifications of the TPB (Ajzen, 2002a, 2002b). The items are *"I have the ability to teach students with ADHD effectively"* and

"Dealing with students with ADHD exceeds my ability". Comprehensibility was tested in a pre-test. The answering format was a VAS varying from *I totally disagree* to *I totally agree* and ranging from zero to five. Cronbach's alpha was $\alpha = .84$ ($M = 2.6$, $SD = 1.28$).

2.3.5.3. Right-wing authoritarianism (RWA). The German short scale on right-wing authoritarianism (KSA-3) by Beierlein, Asbrock, Kauff, and Schmidt (2014) was used to measure RWA, with the three associated subscales (three items per subscale; e.g. *"Society should be tough on outsiders and idlers."*). All subscales are measured using a six-point Likert-type scale ranging from *I totally disagree* to *I totally agree*. In the present study, the overall Cronbach's $\alpha = .82$ ($M = 1.90$; $SD = .80$), and varied between $\alpha = .68$ and $\alpha = .69$ for the different subscales. Thus, we did not use the subscales, but the aggregate mean value of RWA.

2.3.5.4. Social dominance orientation (SDO). SDO was measured using the 12-item German SDO scale designed by Cohrs, Moschner, Maes, and Kielmann (2005), in reference to the scale by Pratto et al. (1994) and the German adaption by Six, Wolfrath, and Zick (2001). The answer format is a six-point Likert-type scale ranging from *I totally disagree* to *I totally agree* (e.g. *"We need strong leaders so that we can live safely in society."*). Cronbach's $\alpha = .81$ ($M = 1.12$, $SD = .65$) in the present study.

2.3.5.5. Big five personality traits. The German translation of the Big Five Inventory (BFI) (Rammstedt & Danner, 2016) measures economically five personality factors. All facets are measured using a five-point Likert-type scale ranging from *very inaccurate* to *very applicable* (e.g. *"I do tasks thoroughly."*). In our sample, the following Cronbach's alpha coefficients were obtained: Extraversion $\alpha = .86$ ($M = 3.65$; $SD = .63$), Agreeableness $\alpha = .78$ ($M = 3.83$; $SD = .5$), Conscientiousness $\alpha = .85$ ($M = 3.71$; $SD = .6$), Neuroticism $\alpha = .82$ ($M = 2.85$; $SD = .64$), and Openness $\alpha = .77$ ($M = 3.61$; $SD = .6$).

2.3.5.6. Stress reactivity. To measure stress reactivity, the Perceived Stress Reactivity Scale (PSRS) was used (Schlotz, Yim, Zoccola, Jansen, & Schulz, 2011). It is a 23-item questionnaire with five subscales and one total scale (four to five items per subscale; e.g. *"When tasks and duties build up to the extent that they are hard to manage"* with the answer possibilities: *"I am generally untroubled, I usually feel a little uneasy, I normally get quite nervous."*). The authors validated the questionnaire using a three-step answer format, each with a visual anchor, which we also used. In our study we only used the total score, and Cronbach's $\alpha = .86$ ($M = 20.74$, $SD = 7.40$).

2.3.5.7. Knowledge. The knowledge scale used in the present study includes twenty-four items on ADHD-specific knowledge and is part of the ASE (Dort et al., under revision). Every correct answer is worth one point and every incorrect answer is worth zero points, with 24 possible points in total. Items were designed to cover the areas etiology, diagnostic & prevalence and intervention, exemplarily items are *"For the clarification of ADHD many diagnostic sources are necessary"*, *"False parenting causes ADHD"*, and *"One single appointment at a psychologist/doctor is sufficient to examine the presence of ADHD."* Cronbach's $\alpha = .85$ ($M = 7.32$, $SD = 4.21$) in the present study.

2.4. Statistical analyses

All analyses were performed using the statistical package IBM® SPSS®24.0 and Mplus 8.4 (Muthén & Muthén, 1998-2017). All raw data have been stored at the Department of Clinical Child and Adolescent Psychology at Philipps University in Marburg, Germany. Inter-correlations between the variables were inspected. A correlation of $|r| = .10$ is interpreted as a low coherence, of $|r| = .30$ as a moderate coherence, and $|r| = .50$ as a strong coherence (Cohen, 1988). Linear path analysis was used to determine the direction of the correlation, and to identify the explained variance. Mediation analysis was used to examine whether the indirect effects between variables were significant. To determine this, bootstrapping with 10,000 iterations was used. Bootstrapping is a statistically powerful method that is independent of the samples' distribution and not susceptible for the type one standard error (Hayes, 2009; MacKinnon, Lockwood, & Williams, 2004; Preacher, Rucker, & Hayes, 2007). Path and mediation analysis were performed with Mplus 8.4 (Muthén & Muthén, 1998-2017), which uses OLS regression yielding standardized path coefficients for direct and indirect effects. The fit of the model examined through the analysis was determined by the following fit indices: At first, the chi-square test of model fit was inspected. A non-significant value ($p > .05$) means that the model is not significantly different from the data (Geiser, 2010). Secondly, a significant p-value ($< .05$) examined by the chi-squared test for the baseline model means that the variables are not uncorrelated (Geiser, 2010). The Comparative-Fit-Index (CFI) and the Tucker-Lewis-Index (TLI) are indicative for a good model fit when they are at least > 0.95 and rather > 0.97 (Geiser, 2010). The Root-Mean-Square-Error-of-Approximation (RMSEA) and the Standardized-Root-Mean-Square-Residual (SRMR) are indicative for a high model fit if < 0.05 (Geiser, 2010). Furthermore, the R^2 is indicative of the variable variance clarification; a value of .02 is rated as low, a value of .13 moderate, and a value of .26 as high (Cohen, 1988). The indirect effect between variables was considered significant if the confidence interval did not include zero (Zhao, Lynch, & Chen, 2010).

3. Results

In answering our research questions regarding which variables have the most influence on pre-service teachers' intention to use CMS, the following calculations were carried out. The correlations between the variables gave preliminary indications of what was relevant, explaining the intention of pre-service teacher to use CMS. All inter-correlations are shown in Table 2.

Two path analyses were run. To answer the first and the second research question, a path analysis was carried out that focused on

Table 2
Inter-correlation between the variables. Notes: ** < .01; * < .05°; O = Openness; C = Conscientiousness; E = Extraversion, A = Agreeableness, N = Neuroticism, SDO = Social dominance orientation, RWA = Right-wing authoritarianism .

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Knowledge	1	-	-	-	-	-	-		-		-	-	-
2. Attitude towards CMS	−.088**	1	-	-	-	-	-		-		-	-	-
3. Attitude towards effective CMS	.310**	.766**	1	-	-	-	-		-		-	-	-
4. Attitude towards ineffective CMS	−.249**	.582**	−.076*	1	-	-	-		-		-	-	-
5. Attitude towards students	−.092**	.085**	.098**	.006	1	-	-		-		-	-	-
6. Perceived control	.041	.107**	.112**	.025	.241**	1	-		-		-	-	-
7. Subjective norm - shortened	.071*	.070*	.099**	−.022	−.123**	−.204**	1		-		-	-	-
8. Stress react	.037	.031	.050	−.048	−.184**	−.193**	.321**	1	-		-	-	-
9. Strain (BSI)	−.137**	−.017	−.111**	.112**	−.012	−.076*	.043	.344**	1		-	-	-
10. Stress (self - report)	.017	.006	−.018	.031	−.341**	−.314**	−.206**	.167**	.029	1			
11. Intention to use CMS	.116	.573**	.437**	.336**	−.183**	−.041	.149**	.115**	−.015	.214**	1		
12. Intention to use effective CMS	.316**	.531**	.720**	−.088**	−.031	.081**	.126**	.109**	−.075*	.058	.694**	1	
13. Intention to use ineffective CMS	−.179**	.216**	−.178**	.560**	−.223**	−.146**	.072	.041	.064	.229**	.626**	−.128**	1
SDO	−.149**	−.079**	−.218**	.161**	−.082**	−.106**	−.070*	−.027	.038	.089*	−.033	−.191**	.167**
RWA	−.171**	−.010	−.189**	.223**	−.203**	−.030	−.019	.035	−.072*	.172**	.088**	−.131**	.258**
O.	.042	.068*	.121**	−.048	.074*	.062*	−.003	−.072*	−.023	−.061*	.007	.109**	−.108**
C.	.076*	.126*	.178**	−.032	−.010	.068*	.051	−.063*	−.090**	.005	.048	.129**	−.075*
E.	.098**	.136**	.151**	.017	.024	.193**	−.064*	−.238**	−.185**	−.043	.079**	.132**	−.034
A.	.109**	.155**	.210**	−.039	.051	.071*	.103**	−.058	−.114**	−.016	.107**	.213**	−.087**
N.	−.026	−.031	−.021	−.018	−.065*	−.159**	.238**	.626**	.353**	.096**	.068*	.034	.056

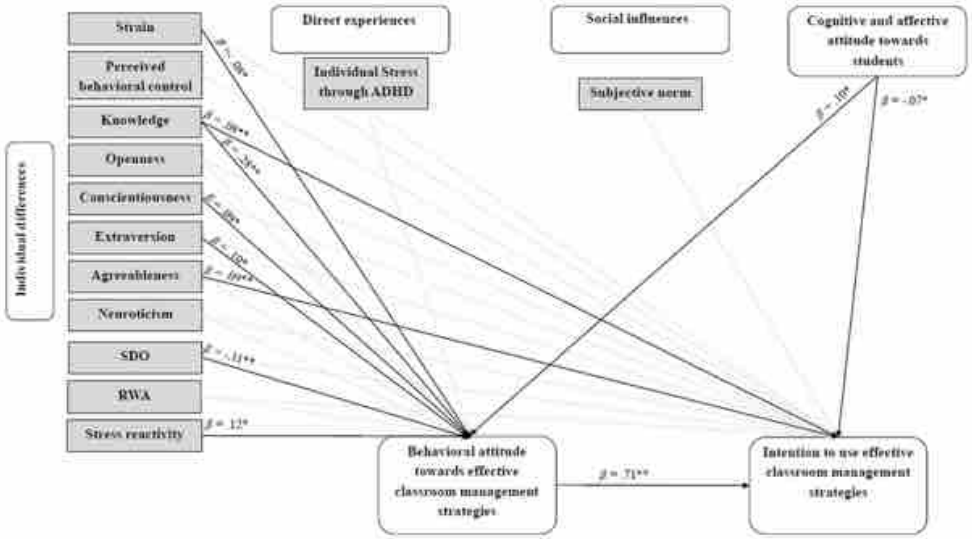

Fig. 2. Path model showing the variables that influence the intention to use effective CMS. Grey arrows are included variables in the analysis, but do not significantly explain variance. Black arrows represent significant relevant variables (* < .05, ** < .01). Path models' fit indices: $R^2_{intention}$ = .59**; $R^2_{behav.\ attitude}$ = .20**; test of model fit: $\chi^2(3) = 6.66$, p = .08; test for the baseline model: $\chi^2(29) = 833.08$, p < .01; *CFI* = 1.00; *TLI* = .96; *RMSEA* = 0.04; *SRMR* = 0.01.

effective CMS, in which intention to use and attitude towards effective CMS were the dependent variables. Fig. 2 shows the outcomes and calculated fit indices.

The path model explaining the intention to use effective CMS had a multiple determination coefficient of R^2 = .59, implying that 59 % of the variance is clarified, indicative of a high variance clarification (Cohen, 1988). Positively influencing variables regarding intention were behavioral attitude towards effective CMS (β = .71, p < .01), knowledge (β = .08, p < .01), and agreeableness (β = .09, p < .01); attitude towards the students with ADHD (β = -.07, p < .05) was a negatively influencing variable. The variance clarification of the behavioral attitude towards effective CMS was at 20 % (R^2 = .20), which can be defined as a moderate to high clarification, according to Cohen (1988). Influencing variables were knowledge (β = .28, p < .01), conscientiousness (β = .09, p < .01), extraversion (β = .10, p < .05), SDO (β = -.11, p < .01), stress reactivity (β = .12, p < .05), strain (β = -.08, p < .05), and attitude towards students with ADHD (β = .10, p < .01). All mediations with the intention to use effective CMS as the dependent variable and behavioral attitude towards effective CMS as intermitting variable were significant as their 95 %-confidence interval did not include zero: knowledge (β = .20 [95 %-CI: 0.15, 0.25]), conscientiousness (β = .07 [95 %-CI: 0.18, 0.12]), extraversion (β = .07 [95 %-CI: 0.01, 0.12]), SDO (β = -.08 [95 %-CI: - 0.14, - 0.03]), strain (β = -.06 [95 %-CI: - 0.11, - 0.01]), attitude towards students with ADHD (β = .07 [95 %-CI: 0.03, 0.13]), and stress reactivity (β = .08 [95 %-CI: 0.02, 0.15]). Fit indices for the whole model all showed a high model fit (test of the model fit: χ^2 [3] = 6.66, p = .08; test for the baseline model: χ^2 [29] = 833.08, p < .01; *CFI* = 1.00; *TLI* = .96; *RMSEA* = 0.04; *SRMR* = 0.01).

To answer the third and the fourth research question, a path analysis was carried out that focused on ineffective CMS, in which intention to use and attitude towards effective CMS were the dependent variables. Fig. 3 shows the outcomes and calculated fit indices.

The path model focusing on ineffective CMS explained 44 % of the intentions' variance. Significantly influencing variables were behavioral attitude towards ineffective CMS (β = .56, p < .01), perceived behavioral control (β = -.09, p < .01), knowledge (β = -.06, p = .03), individual stress related to students' ADHD (β = .13, p < .01), and attitude towards students with ADHD (β = -.09, p < .01). The variance explanation of the behavioral attitude towards ineffective CMS was 10 % (R^2 = .10), which was defined as low to moderate. Influencing variables were knowledge (β = -.20, p < .01) and RWA (β = .13, p < .01). All mediations with the intention to use ineffective CMS as the dependent variable and the behavioral attitude towards ineffective interventions as the intermitting variable were significant as their 95 %-confidence interval did not include zero: knowledge (β = -.11 [95 %-CI: - 0.12, - 0.01]) and RWA (β = .07 [95 %-CI: 0.03, 0.12]). Fit indices for the whole model all showed a high model fit (test of model fit: χ^2 [8] = 10.18, p = .25, test for the baseline model: χ^2 [29] = 516.21, p < .01; *CFI* = 1.00; *TLI* = .98; *RMSEA* = 0.02; *SRMR* = 0.02).

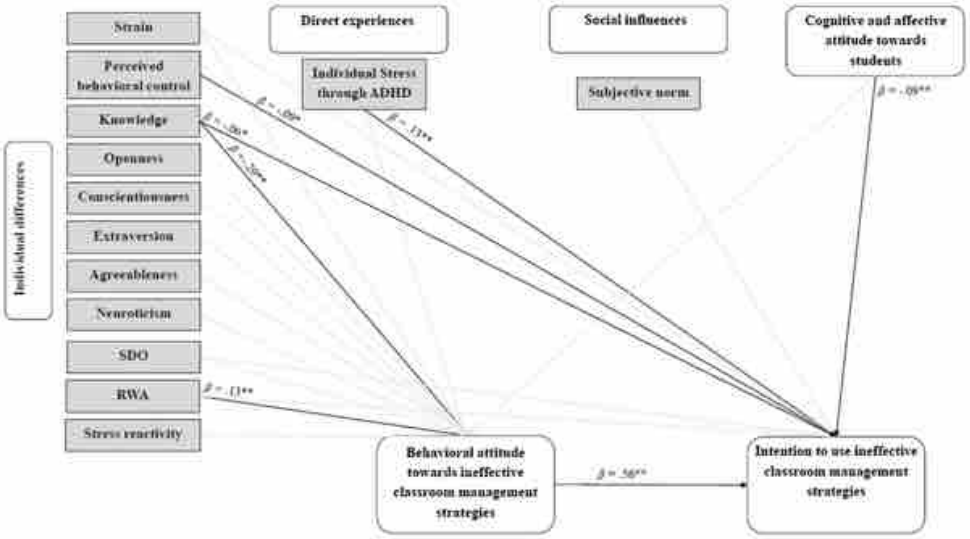

Fig. 3. Path model showing the variables that influence the intention to use ineffective CMS. Grey arrows are included variables in the analysis, but do not significantly explain variance. Black arrows represent significant relevant variables (* < .05, ** < .01). Path models' fit Indices: $R^2_{intention}$ = .44**; $R^2_{behav.\ attitude}$ = .10**; test of the model fit: $\chi^2(8) = 10.18$, $p = .25$; test for the baseline model: $\chi^2(29) = 516.21$, $p < .01$; *CFI* = 1.00; *TLI* = .98; *RMSEA* = 0.02; *SRMR* = 0.02.

4. Discussion

The aim of this study was to examine why the use of effective CMS is low, even though evidence supporting the effectiveness of CMS is well documented and ineffective CMS are still used. At first, we summarize the results with the aim to answer the research questions and afterwards we discuss the results regarding the variables.

The first research question ("Can the intention to use effective CMS be explained by pre-service teachers' behavioral attitude towards effective CMS as well as through individual differences, direct experiences, social influences, and their attitude towards students with ADHD?") is partly confirmed as the tested model explains a large amount of variance with 59 % of pre-service teachers' intentions to use effective CMS and results in good model fit indices. Mostly the attitude towards the CMS, the attitude towards students with ADHD and individual differences are important, whereas direct experiences and social norms do not have significant explanatory power.

The second research question ("Are all variables that influence behavioral attitude towards effective CMS also influencing the intention to use effective CMS mediated through behavioral attitude towards effective CMS?") is confirmed as every variables that has an explanatory effect regarding the attitude towards effective CMS has additionally a significant indirect effect on the intention to use effective CMS.

The third research question ("Can the intention to use ineffective CMS be explained by pre-service teachers' behavioral attitude towards ineffective CMS as well as through individual differences, direct experiences, social influences, and their attitude towards students with ADHD?") is partly confirmed. The amount of variance explained to use ineffective CMS' is high and the tested model shows good model fit indices. However, it also shows that social influences as opposed to individual differences, attitude variables and direct experiences do not contribute to variance explanation.

The fourth research question ("Are all variables that influence behavioral attitude towards ineffective CMS also influencing the intention to use ineffective CMS mediated through behavioral attitude towards ineffective CMS?") is confirmed as every variables that has an explanatory effect regarding the attitude towards ineffective CMS has additionally a significant indirect effect on the intention to use ineffective CMS.

4.1. Expectations and attitude

Behavioral attitude towards CMS is the most important factor in influencing the intention to use both effective and ineffective CMS. This meets Ajzens' (2005) assumption, that the expectation a behavior will show effective consequences increases the intention to perform that behavior. This means pre-service teachers will intend to use CMS as long as they are expected to be effective, whether they are actually effective or not. Thus, it is more important to believe in the effectiveness of CMS than to simply know about them. This is an effect found not only in our analysis. A Cochrane review regarding helping strangers in emergency situations concluded

that imparting knowledge alone would not lead to increased helping behavior. It was also necessary to overcome assumed obstacles or, in other words, make individuals believe their behavior would be effective (Van de Velde et al., 2009).

Furthermore, attitude towards effective CMS is influenced by pre-service teachers' attitude towards students with ADHD. No similar effect was found for ineffective CMS. This indicates that the better a pre-service teacher's attitude is towards students with ADHD, the easier it will be for the pre-service teacher to believe CMS will be effective, and the stronger his or her intention will be to use them. Various studies have shown that teachers often feel more stress from, and have a more critical attitude towards, students with ADHD (Dort et al., under revision; Ghanizadeh, Bahredar, & Moeini, 2006; Greene et al., 2016). It is necessary to improve (pre-service) teachers' attitudes towards students with ADHD to open a mental door to the use of effective CMS.

A more positive attitude towards students with ADHD decreased pre-service teachers' intention to use both effective and ineffective CMS. A possible interpretation of this finding would be that a generally better opinion of students with ADHD is good in changing attitudes towards CMS, but at the same time, it decreases the subjective pressure to act.

4.2. Direct experiences

Individual stress pre-service teacher expect to experience when teaching students with ADHD played an important role in the intention to use ineffective CMS. This finding indicates that higher stress through students with ADHD leads to the intention to use ineffective CMS. Furthermore, it shows that expectations of stress are more important than currently perceived strain measured through the BSI. Performance under stress usually follows an inverted U-function; the performance increases until a stress-peak is reached, and is then followed by a performance decrease (Anderson, 1976). The same mechanism seems to be relevant for pre-service teachers.

4.3. Social influences

Subjective norms are not relevant in influencing the intention to use CMS or attitudes towards it. Presumably, this is due to the participants we included in our study. Pre-service teachers usually do not work in schools; thus, they do not know, and probably do not care, what other teachers may think about CMS.

4.4. Individual differences

Psychological strain shows a relevant impact on influencing the attitude towards CMS. It has a negative effect towards the attitude of effective CMS. Teachers experience a lot of job stress and dissatisfaction that can lead to a high prevalence of mood disorders (Howard et al., 2017). It is easy to understand why higher psychological strain would lead to decreased attitude towards effective CMS. The more one feels stressed, the less one is engaged in daily job tasks, and the worse is the attitude towards effective CMS. This psychological strain, paired with disruptive students, presents (pre-service) teachers with difficult tasks, and makes reliance on effective CMS less likely.

Perceived behavioral control was only relevant in negatively influencing the intention to use ineffective CMS, and thus seemed to have a preventive function. The higher perceived control, the less ineffective and possible harmful CMS were intended to be used, but perceived control did not increase the usage of effective CMS. Furthermore, pre-service teachers are not used to working in schools, thus they know less about possibilities to use CMS. However, if they feel they can effectively teach students with ADHD, they do not seem to want to use ineffective CMS.

Knowledge increased the intention to use effective CMS as well as improved the attitude towards those strategies, while also decreasing the intention to use ineffective CMS and the attitudes towards them. This influence of knowledge is consistent with findings of previous studies (Bekle, 2004). The effect on attitude towards CMS is much higher than on the intention to use them (Ajzen, Joyce, Sheikh, & Cote, 2011). A knowledge-minimum seems to be a necessary precondition, but knowledge alone is not sufficient to change one's intentions (DiClemente, 1989; Fisher, 1992).

Only agreeableness had an effect on the intention to use effective CMS. Regarding the intention to use ineffective CMS, no personality variable had an influence. This is nearly consistent with the findings of Ajzen (2005), who said that personality changes the attitude, but not the intention behind or the execution of the behavior in question. Agreeableness, according to DeYoung (2015), leads to cooperative and altruistic behavior, and is able to help explain why some pre-service teachers, despite challenges, intended to use effective CMS.

Conscientiousness, extraversion, stress reactivity positively, and SDO negatively influenced pre-service teachers' attitudes towards effective CMS, while attitudes towards ineffective CMS were positively influenced by RWA. Effective CMS are often strategies that do not emphasize hierarchical disparities between (pre-service) teachers and students and aim to downsize hierarchies. For pre-service teachers who rate high on RWA and SDO, it would be important to focus not only on the effectiveness of CMS, but to emphasize that the benefits of CMS do not challenge their authority. Conscientiousness and extraversion seemed to be helpful in generating a more positive attitude towards the use of effective CMS, and explains why the attitude varies widely. DeYoung (2015) offers explanations for this phenomenon. More conscientious pre-service teachers tend to prioritize non-immediate goals (DeYoung, 2015), and this could help them to be more open towards strategies that might need some time to show their full effect. More extraverted pre-service teachers tend to be more goal-oriented (DeYoung, 2015), and most likely feel the use of effective CMS promises to be more worthwhile.

4.5. Implications

Taken together, primarily the attitude towards CMS influences the intention to use more effective and fewer ineffective CMS. Individual differences influence intention as well, but to varying degrees. Direct experiences as well as individual differences not only affect the attitude, but also the intention to use CMS. Thus, for future training with teachers, a focus on those expectations and therefore also the attitude is highly relevant. Pre-service teachers not only need more knowledge about CMS, but also the conviction that effective CMS are efficacious. Furthermore, psychological strain reduces the intention to use effective CMS indirectly, and perceived individual stress through ADHD increases the intention to use ineffective CMS, which suggests that even pre-service teachers have to learn how to deal with stress in their everyday live. Perceived behavioral control seems to have a preventive function regarding ineffective CMS, implicating that the more they know what they are capable of the less they will rely on ineffective CMS. Teacher training should thus focus on increasing the conviction to be able to teach students with ADHD, that the known CMS will work and that there are effective strategies to cope with stress and strain.

How those expectations and therefore also the attitude can be violated and shaped, and what kind of coping strategies are obstacles to this shaping process, should be clarified through future research. For example, it could be that (pre-service) teachers tend to immunize when an effective CMS works with a student with ADHD and then they will not use it again (e.g. "this worked once, but that is an exception"). Conversely, this can happen when using an ineffective CMS. Even if using an ineffective CMS does not improve student behavior, immunization can occur and the ineffective strategy is used again. The mechanism found in this study should be tested for relevance in other subgroups and experimentally. Therefore, a study with current teachers is already completed, and a report of its findings will follow. An analysis that includes different types of schools may be relevant.

4.6. Limitations

The findings of the present study allow us to inspect the nature of attitude and give us preliminary evidence for what may be important for in-service teachers. Additionally, the results illustrate that we should not solely focus on pre-service teachers, as they have no experience putting CMS into practice.

The TPB is based on the assumption that rational choices underlie behavior, and some researchers argue that human behavior is not rational (Fazio, 1990). Teachers' behavior in the classroom is, in most cases, prepared and should be viewed as rational; however, behavior is, of course, not rational in all cases. Even if the TPB is not the perfect picture of reality, it is at least good enough to predict behavior properly.

Another issue that we have to face is the *intention-behavior gap* implicating the fact that a medium to high change in intention just leads to a small to medium change in the actual behavior (Sheeran & Webb, 2016). As we only measure the intention to use CMS the actual behavior could be a bit different from the intention, though intention is still the best predictor for the actual behavior (Sheeran & Webb, 2016). In experimental surveys this issue needs to be tested and further possibilities to overcome this gap, like making the behavior easier to perform or make the goal part of their identity need to be considered (Sheeran & Webb, 2016). At the moment, we are planning a virtual reality study with which we aim to investigate how teachers behave in a virtual classroom when a student shows symptoms of ADHD.

The direct measure of attitude is disputed for good reasons. It can be assumed that there are differences between attitudes measured implicitly and explicitly, and both need to be assessed (Ajzen, 2005; Niemand & Fleischhauer, 2012). The cross-sectional design was also a limitation, as it did not allow us to make more than correlative assumptions about effects or the impact of variables. Furthermore, the BFI is not very much focused on details and another measurement for personality variables would probably have provided more detailed results. However, we decided to use the BFI to keep the online survey as short as possible, to avoid an overload of questions and ensure a high participation rate.

Due to SoSciSurveys' data privacy limitations it was not possible to get more information about the dropped out pre-service teachers. Therefore, it is not possible to compare the dropped out with the pre-service teachers that completed the survey.

4.7. Conclusion

The first examination of the presented path model suggests for effective CMS to be put into practice, it is necessary that pre-service teachers expect effective CMS to be effective and ineffective CMS should be classified as ineffective. Furthermore, direct experiences and individual differences have a shaping function regarding the attitude towards CMS and thus also towards expectations. The attitude towards CMS needs to be changed to increase the probability pre-service teachers will integrate CMS into their daily routines. We are currently conducting a virtual reality investigation to examine those findings experimentally.

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7.5 Studie 5

sustainability

MDPI

Article

Influences on teachers' intention to apply classroom management strategies for students with ADHD: A model analysis

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Abstract: Students with ADHD show reduced on-task behavior at school and educational problems due to the symptoms associated with this diagnosis. Classroom management strategies (CMS) are important to reduce impairment by ADHD but are not yet well implemented. In this study we analyzed whether the facilitators and barriers regarding the intention to apply CMS identified for pre-service teachers are replicable in a sample of teachers in service. Overall, 599 teachers in service completed an online survey on the intention to apply CMS, their attitude towards CMS and towards students with ADHD, direct experiences, individual differences, and social influences. We calculated path models that significantly clarified variance in the intention to apply CMS ($R^2_{\text{intention to use effective CMS}} = .47$, $p < .01$ and $R^2_{\text{intention to use ineffective CMS}} = .39$, $p < .01$). It turns out that similar variables are relevant to teachers in service as well as pre-service teachers. A models' extension to include variables that do justice to the difference between the two groups, such as work experience, shows a better model fit. Especially, attitude towards CMS, attitude towards students with ADHD, strain, perceived behavioral control and teachers' affiliation with primary or special needs schools are important variables regarding the intention to apply CMS. The implementation of effective and elimination of ineffective CMS should thus be addressed by targeting teacher's attitudes towards children with ADHD. Furthermore, strain prevention and education might enhance the application of effective CMS.

Keywords: ADHD; teachers; knowledge; attitude; expectation; intervention; classroom; classroom management strategies

1. Introduction

1.1 Attention Deficit/Hyperactivity Disorder and effective treatment

To make a diagnosis of Attention Deficit/Hyperactivity Disorder (ADHD), the core symptoms inattention, hyperactivity, and impulsivity need to manifest cross-situationally, e. g. at home and at school, and result in clinical impairment [1,2]. ADHD affects five to seven percent of students in schools [3–6]. Symptoms like failing to pay attention to details, having difficulty sustaining attention or organizing a task, or excessive talking or fidgeting cause reduced on-task behavior at school and often result in educational problems that are predictive for underachievement and a heightened risk for delinquency [7–11].

Pharmacological treatment that targets those core symptoms is the most frequent intervention for students with ADHD, and combining medication and behavioral therapy (as well as each on its own) reduce ADHD symptoms, but the effects are attenuated with respect to school achievement [12,13]. As the impairment is specifically serious at school, students are often referred for diagnostics and treatment after entering school.

This highlights the need for treatments specifically targeting impairments associated with schools.

Evidence-based classroom management strategies (CMS) are known to effectively reduce disruptive classroom behavior of students with ADHD [14]. Therefore, CMS are an important, impactful treatment module that cannot just reduce the specific academic impairments, they might also influence the long-term negative effects associated with ADHD such as lower educational accomplishments [14,15]. Finally, this might enhance the chance for equal academic achievement for all students.

A meta-analysis [14] supported previous studies' findings that demonstrate the effectiveness of such CMS in reducing unfavorable classroom behavior. Nevertheless, teachers rely more often on ineffective (e. g. threatening the student with punishment) than effective CMS [16, 17]. Due to this gap between science and practice, a lot of potential is lost on part of both the teachers and students [17,18].

1.2 Reasons for the observed science-practitioner gap

One reason for this gap between science and practice is the reduced communication between the scientific fields of psychology/psychiatry and education [19]. Most research comes from the field of psychology/psychiatry and fails to take the teachers' perspective [19]. This might be why effective CMS have not found their way into teachers' daily school routines yet.

When asking for contributions to facilitating effective CMS implementation, an initial model analysis with data from 1086 pre-service teachers revealed that the behavioral attitude towards CMS is the most important variable in explaining variance in the intention to apply effective and ineffective CMS [20]. According to Ajzen [21], the attitude towards a behavior (e. g. applying a CMS) is the expectation that the behavior will have (positive) consequences. This implies that the expectation that the CMS will induce a favorable outcome is the most important predictor for the intention to apply it.

An Austrian study that included teachers in service and teachers not regularly working in schools showed also that behavioral attitude is the most important variable in clarifying variance in the intention to apply CMS [22]. Furthermore, their study demonstrated significant differences between in-service and pre-service teachers [22].

According to Theory of planned behavior (TPB) by Ajzen [21], there are two components of attitude. Next to the behavioral attitude, he defines the attitude towards an object as a further variable that in turn influences one's behavioral attitude [21]. In our context, the attitude towards an object reflects the attitude of teachers towards affected students. In our study with pre-service teachers, we demonstrated that the attitude towards students with ADHD also impacted the intention to apply CMS [20]. Moreover, other variables such as direct experiences, social influences, and individual differences influence attitudes and behavior intention according to the violation-expectation (VoilEx) model by influencing expectations that represent the behavioral attitude [20,23].

1.3 Expectations defined as behavioral attitude

The ViolEx model defines expectations as relations between specific situations (applying CMS for a student) and associated responses (CMS fails to work, and student continues behaving disruptively) resulting from learning processes. The exemplarily described learning process results in a negative behavioral attitude towards the CMS applied that in turn lowers the intention to apply it [20,23]. This expectations and therefore behavioral attitude are influenced by specific experiences, social influences, and individual differences [20,23]. We further discuss these aspects in the sections below. Figure 1, taken from Strelow, Dort, Schwinger and Christiansen, illustrates expectations' influences and impacts [20].

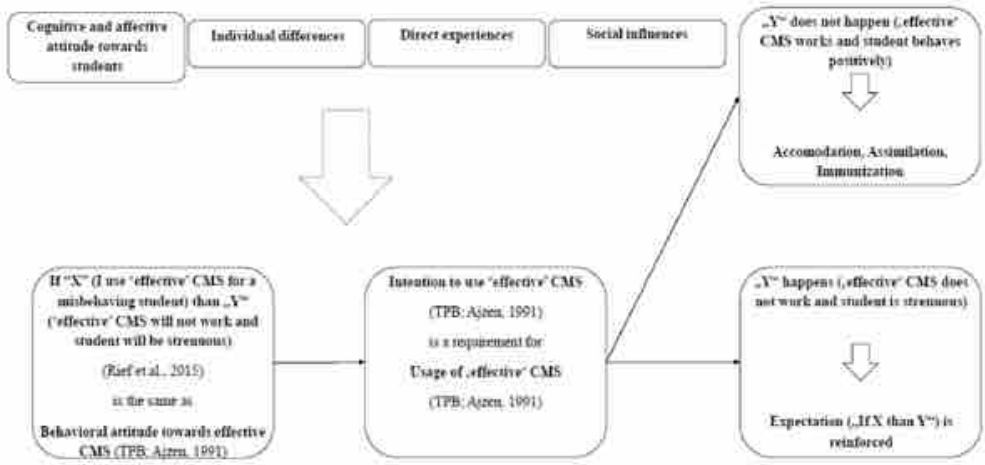

Figure 1. We define expectations as the behavioral attitude. Cognitive and affective attitude, individual differences, direct experiences, and social influences influence expectations and therefore the behavioral attitude. The behavioral attitude influences the intention and applying of classroom management strategies. Depending on whether the expectation is unfulfilled or confirmed, there will be a learning, reinforcement or no influence on the expectation. Figure is taken from Strelow, Dort, Christiansen and Schwinger [20] with kind approval.

1.3 Influences on attitude and the intention to apply CMS

1.3.1 Direct experiences

Direct experiences with students affected by ADHD led teachers to classify them as stressful [24], and this self-perceived individual stress correlated positively with the intention of pre-service teachers to apply ineffective CMS [20]. Further, more direct experiences with students with ADHD result in stronger negative responses towards them [24]. An investigation that focused on the differences between pre- and in-service teachers showed that teachers with more direct experiences responded more negatively towards students with ADHD [24]. Most likely this is associated with work experience, e.g. more contact with such students. Work experience as assessed by numbers of years on the job is thus a variable that differentiates between pre- and in-service teachers and between teachers in service. Therefore, work experience may be an additional potential facilitator of effective or ineffective CMS.

Apart from this, experience differs according to the education of teachers, i.e. whether they have been trained to teach students with special needs, or those in primary or secondary school. The majority of research on CMS or ADHD focuses on primary school teachers [25–27]. Additionally, there is a difference in knowledge between teachers who instruct students with special needs (and were trained to do so) and those who do not [28]. In contrast to main, middle or academic high school teachers, primary and special needs school teachers are trained to support a wide range of students and might therefore be given other information and other strategies during their training. The work experience assessed by years on the job and the education received are therefore important variables when assessing potential influences on the intention to apply CMS.

1.3.2 Social influences

A social influence is a subjective norm, namely (according to Ajzen) the willingness to behave according to the expectations of relevant peers (e.g. "I implement effective CMS in my classroom, as my school values those") [21,29]. The subjective norm is perceived as a relevant factor for forming attitudes and behavioral intentions [21,29],

though it did not prove to be a significant predictor in our study on pre-service teachers' attitudes towards children with ADHD and their intention to implement CMS [20]. As pre-service teachers do not regularly teach in schools, their social environment might differ from that of in-service teachers. In-service teachers might differ in this respect also.

1.3.3 Individual differences

Individual differences also influence how attitudes and behavioral intentions are formed. Personality factors like the big five (openness, conscientiousness, extraversion, agreeableness, neuroticism) as well as social dominance orientation (SDO) and right-wing authoritarianism (RWA) are relevant variables in this context, and influence the intention of pre-service teachers to apply CMS [30]. Another individual difference is psychological strain. Previous research also shows that teachers often experience psychological strain, which is associated with their attitude towards students with ADHD [31,32]. More precisely, psychological strain is linked to a weaker intention in pre-service teachers to implement effective CMS [20]. However, pre-service teachers might not feel the same psychological strain as in-service teachers. To get an impression of how much strain affects in-service teachers, this needs closer examination. Stress reactivity is a variable revealing the intensity of individual reactions to stressful situations, which are known to differ individually among people [33]. It describes why some people react differently to stress in the same situation [33]. People who score low on stress reactivity are able to handle stressful events in a calm and confident manner, and can set themselves appropriate goals [33]. This is linked to a stronger intention in pre-service teachers to apply effective CMS, and is another relevant individual difference [20].

Knowledge as another individual difference in conjunction with ADHD proved to affect the intention of pre-service teachers to implement CMS [20]. As pre-service teachers (unlike those in in service) might differ in knowledge, this study aims to clarify potential similarities and differences between groups of pre- and in-service teachers [20,34]. These differences can result from the fact that the training teachers receive may have improved in recent years, and more information about ADHD might already be included in university teacher-training. On the other hand, in-service teachers have had contact with many students, some of whom might have been affected by ADHD. Thus, in-service teachers might already have profound knowledge about ADHD. Perceived behavioral control is also an individual difference, and with respect to the TPB an important predictor of behavior [29]. It is defined as the self-assessed expectation that one can execute a behavior. In CMS, terms, this would be the conviction that a teacher is able and has all means available to carry them out [21,29]. In our investigation with pre-service teachers, perceived behavioral control correlated negatively with the intention to apply ineffective CMS [20]. It is therefore important to examine whether this also applies to in-service teachers.

Individual demographic differences such as sex have a direct effect on teaching behavior. There is evidence that male teachers teach differently than female teachers [35]. However, to our knowledge, this effect has not yet been verified in terms of classroom strategies. Nevertheless, this variable might clarify variance in the intention to apply CMS. Furthermore, as work experience and age correlate closely, it is not entirely clear whether work experience's effect might not also be explained by age. We therefore examined sex and age in this investigation.

1.4 The present study

Summing up, previous research indicates that attitude shapes the intention to apply CMS. Attitudes are influenced by direct experiences, social influences, and individual differences. As outlined above, pre- and in-service teachers differ in some variables. Therefore, the present study examines whether the model for pre-service teachers can be replicated in a sample of in-service teachers and whether expanding upon the model with the variables sex, age, and work experience (according to years on the job) and type

of school (primary and special needs school vs. secondary school) improves the model fit. Our study therefore posed these questions:

1. Can the model to implement (in-)effective CMS for pre-service teachers (with the variables attitudes, direct experiences, social influences, individual differences) be replicated in a sample of in-service teachers?
2. Does expanding the model for in-service teachers by considering the variables sex, age, work experience according to years on the job and type of school result in an improved model fit?

2. Materials and Methods

2. 1 Sample Population

The online tool SoSciSurvey (https://www.soscisurvey.de/) was used in the present study with teachers from Germany. The survey was started by N = 2320 potential participants, the final sample population included N = 635 participants who completed the survey (drop-out rate 72.63%). Overall, 5.67 % (n = 36) of the participants were excluded from the analysis, because they completed less than 75 % of at least one scale, thus our analysis was based on N = 599 teachers. The mean age of the participants was M = 41.33 years (SD = 10.01). The participants subdivided into 17.7 % males, and 82.3 % females; no one identified as diverse. Details on the sample and the type of school participants taught at are illustrated in Table 1.

Table 1. The school where teachers claimed to teach. Information about N = 599 participants

School type	%	Number (absolute)
Primary school (Grundschule)	54.3	325
Comprehensive school (Gesamtschule)	20.0	120
Main school (Hauptschule)	7.5	45
Middle school (Realschule)	8.3	50
Academic high school (Gymnasium)	7.2	43
Special needs school (Förderschule)	9.3	56
Other (Sonstige)	5.5	33

Note. The percentages can exceed 100. Due to the school systems in Germany, more than one school could be selected.

The majority of teachers were teaching in Hessia (59.6%) and Lower Saxony (29.9%). Only a few teachers from other federal states participated in this study, although every federal state contributed participants. These ranged between 3.8% (Saarland) and 0.2% (Berlin, Brandenburg, Bremen, Mecklenburg-Western Pomerania). The teachers stated that they had M = 13.27 (SD = 9.14) years of work experience with a minimum of one year and a maximum of 42 years. In addition, the teachers stated that during their career they instructed M = 16.27 (SD = 24.24) students with ADHD with a minimum of one and a maximum of 150 students.

2.2 Procedure and Sequence of the Survey

E-mail addresses of all school types were compiled in all federal states via the official schools' internet pages. Afterwards, we sent the link leading to the survey via e-mail to schools with the request that it be passed on to teachers.

The link was also distributed via Facebook groups to teachers. The subject lines in the e-mail and Facebook posts included information on possible prizes for participation, to be awarded via a raffle. It was possible to win a Nintendo Switch, a voucher for a wellness-weekend, or two tickets for a musical (approximate value 300 Euros). The e-mails and Facebook posts also included a cover note that informed about the study,

the raffle, and the link to the survey. The first page of the survey included detailed information on the purpose of the study, data collection and storage, and informed about the possibility to drop out of the study at any time with no consequences. All participants were asked to comply with those requirements, otherwise, they could not proceed with the survey. Apart from the sociodemographic information, our survey included questions on variables that had been identified as relevant for predicting pre-service teacher classroom behavior [20]. Those included questions on personality, knowledge, attitudes towards CMS and students with ADHD, and strategies to handle students' classroom behaviors (see measure section for details). At the start of the survey, a short case vignette depicting a typical student with ADHD was presented as a priming stimulus. The survey ended with the option to receive further information on the study and an option to participate in the raffle. The survey was online between April and October 2018.

2.3 Measures

As this study is a replication of our study that incorporated the same survey completed by pre-service teachers [20], only a few adjustments were made with respect to wording to fit the in-service sample; some scales were shortened based on prior results.

2.3.1 Intention to implement Classroom Management Strategies (CMS)

The ADHD School Expectation Questionnaire (ASE) was used to assess CMS of teachers when handling ADHD-related behavior in their classrooms [36]. The ASE differentiates between effective and ineffective strategies using a 12-point Visual Analogue Scale (VAS) ranging from never to very often. Values are transformed into an interval scale from zero to one. The subscale on effective strategies has 15 items, the one on ineffective ones 12. Psychometric properties are satisfactory with Cronbach's $\alpha = .81$ for the effective CMS scale ($M = .74$, $SD = .09$), and $\alpha = .74$ ($M = .36$, SD = .14) for the ineffective one; total scale: $\alpha = .72$ ($M = .57$, $SD = .09$).

2.3.2 Attitude towards students with ADHD and towards Classroom Management Strategies (CMS)

The ASE further assesses affective and cognitive attitudes of teachers towards their students with 33 items on a 12-point VAS [36]. Items measuring the cognitive part describe different behavior patterns, and the rater indicates whether that behavior is likely or unlikely (coded from 0 to 1) in a student with ADHD and whether that behavior is perceived as positive or negative (coded from - 3 to + 3). In reference to Ajzen [29], the behavior likelihood and associated positive or negative ratings are multiplied afterwards. The affective part of the scale includes items that assess the emotions a teacher may feel towards students with ADHD. Those are rated as likely or unlikely (coded from 0 to 1) and whether they are negative or positive (coded from -3 to +3). Internal consistency is satisfactory with $\alpha = .85$ ($M = -13.12$, $SD = 14.66$).

The behavioral attitude subscale consists of 28 items that are rated on a 12-point VAS ranging between not effective at all and very effective. With reference to Ajzen [21,29] the behavioral attitude is assessed on the basis of the behaviors' expected effectiveness. Values are re-coded from zero to one. This scale consists of the two subscales attitude towards the effective CMS ($\alpha = .87$, $M = .76$, $SD = .14$) and the attitude towards ineffective CMS ($\alpha = .71$, $M = .26$, $SD = .13$). Cronbach's alpha for the total scale is $\alpha = .75$ ($M = .54$, $SD = .09$).

2.3.3 Direct Experiences

2.3.3.1 Individual stress through ADHD in the classroom

Teachers individual stress levels are assessed with one item ("How high would you rate your stress due to the behavior of students with ADHD in the classroom?"). This item is also scored on a 12-point VAS ranging from *not at all* to *very massive* and transformed afterwards to range from zero to five. The mean of the item is $M = 3.28$, $SD = 1.25$.

2.3.3.2 Work experience assessed in years and school type at which they were trained to teach

We investigated work experience as years the participants had taught as a teacher (M = 13.27, SD = 9.14, R = 1_{min} – 42_{max}). Furthermore, they informed us about the type of school where they teach (further results are depicted in paragraph 2.1). For this investigation, we put the primary and special group teachers in one group, and the others in a comparison group.

2.3.4 Social Influences

2.3.4.1 Subjective norm

Subjective norm is assessed with six items based on the theory of planned behavior. A 12-point VAS (I totally disagree to I totally agree) is used that later ranges from zero to five. This scale revealed unacceptable Cronbach's alpha values (α =.15, M = 2.95, SD = 0.61). A shortened version with three items leads to better, but still unsatisfactory values: α = .51 (M = 3.27, SD = 1.00); discriminatory r_{it} = .29 to r_{it} = .41

2.3.5 Individual Differences

2.3.5.1 Big Five personality traits

To assess the big five personality factors, we employed the German short version of the Big Five Inventory (BFI-K) [37,38] with a five-point Likert scale (very inaccurate to very applicable). The psychometric properties were satisfactory in our study with extraversion α = .75 (M = 3.89; SD = .65), conscientiousness α = .71 (M = 3.98; SD = .61), neuroticism α = .66 (M = 2.60; SD = .67), and openness α = .75 (M = 4.00; SD = .65). The value for agreeableness α = .52 (M = 3.73; SD = .52) was not satisfactory.

2.3.5.2 Right-wing authoritarianism (RWA)

RWA was assessed via the German short version on right-wing authoritarianism (KSA-3) by [39]. RWA's aggregated value is measured using a six-point Likert-type scale (I totally disagree to I totally agree). The overall Cronbach's α is .62 (M = 2.09; SD = .94).

2.3.5.3 Social dominance orientation (SDO)

The 12-item German SDO scale ([40] measures SDO on a six-point Likert-type scale (I totally disagree to I totally agree). Cronbach's α = .80 (M = 1.16, SD = .65) in the present study.

2.3.5.4 Psychological strain

Psychological strain is assessed via the short version of the Brief Symptom Inventory (BSI) [41,42] that consists of 18 items rated on a four-point Likert scale ranging from nothing at all to very strong. The Global Severity Index (GSI) summarises all subscales and is therefore used in this survey as a marker of psychological strain. Internal consistency is satisfactory for this study with α = .83 (M = 3.57, SD = 0.63) for the GSI.

2.3.5.5 Stress reactivity

The 23-item Perceived Stress Reactivity Scale (PSRS) with five subscales and one total scale was used [43] to measure stress reactivity (e. g. When I want to relax after a hard day at work…) with these possible answers: That's usually quite difficult for me, I usually succeed, I usually have no problem at all. The total score used in this study has an acceptable Cronbach's α value of .88 (M = 20.79, SD = 7.46).

2.3.5.6 Knowledge

Knowledge was measured with the corresponding ASE scale including 24 items [36]. Correct answers are credited with 1; incorrect ones with 0. Altogether, 24 credits can be obtained. Cronbach's α is satisfactory with .78 (M = 9.25, SD = 4.29).

2.3.5.7 Perceived behavioral control

Two items based on the TPB were generated to measure perceived behavioral control. The answers were assessed with a 12-point VAS (I totally disagree to I totally agree)

and were transformed afterwards in a scale from zero to five. Cronbach's alpha was α = .79 (M = 2.82, SD = 1.24) and showed a discriminatory power of r_{it} =.66.

2.3.5.8 Sex and age

As depicted in paragraph 2.1 the participants answered the question about the sex they identified with. They were also asked how old they were (M = 41.33 years, SD = 10.01, $R = 24_{min} - 65_{max}$).

2. 4 Statistical Analyses

All analyses were conducted using IBM® SPSS®24.0 and Mplus 8.4 [44]. All raw data are stored at the Department of Clinical Child and Adolescent Psychology at Philipps University Marburg, Germany. At first, inter-correlations between the assessed variables are shown ($|r|$ = .10 is defined as a low, $|r|$ = .30 as a moderate, and $|r|$ = .50 as strong coherence [45]). Linear path analysis with Mplus 8.4 [44] is used to display, calculate, and check complex relationships between variables, and to identify the explained variance. Mediation analyses are carried out using bootstrapping with 10,000 iterations examining significant indirect effects. Standardized path coefficients were calculated. As fit indices squared-chi-tests, the Comparative-Fit-Index (*CFI;* should be higher than 0.95, best above 0.97), the Tucker-Lewis-Index (*TLI;* should exceed 0.95, best above 0.97), Root-Mean-Square-Error-of-Approximation *(RMSEA;* should be under 0.05), and Standardized-Root-Mean-Square-Residual (*SRMR;* should be under 0.05) were used [46]. Additionally, R^2 was used to estimate how high the explained variance of the variables is. A value of .26 is rated as high variance explanation, a value of .13 as moderate and a value of .02 as low [45].

First, the path analyses that fitted best for pre-service teachers [20] were replicated. Second, the following variables were added: sex, age, primary school/special needs school teachers, work experience assessed in years and school type they were educated to teach at.

3. Results

3.1 First research question ("Can the model to apply (in-)effective CMS for pre-service teachers be replicated in a sample of in-service teachers?")

To answer our first research question, we replicated the variables that fit best for pre-service teachers [20]. This led to an unsatisfactory fit regarding the effective CMS' model ($R^2_{intention}$ = .37**; $R^2_{behav.\ attitude}$ = .17**; test of model fit: $\chi^2(3) = 36.56$, $p < .01$; test for the baseline model: $\chi^2(29) = 394.00$, $p < .01$; $CFI = 0.91$; $TLI = 0.11$; $RMSEA = 0.15$; $SRMR = 0.04$).

The replication investigation for ineffective CMS resulted in a good model fit ($R^2_{intention}$ = .36**; $R^2_{behav.\ attitude}$ = .09**; test of model fit: $\chi^2(8) = 6.01$, $p = .65$; test for the baseline model: $\chi^2(29) = 284.370$, $p < .01$; $CFI = 1.00$; $TLI = 1.00$; $RMSEA = 0.09$; $SRMR = 0.02$).

3.2 Second research question ("Does expanding the model for in-service teachers result in an improved model fit?")

To answer our second research question, we conducted two further analyses with the above-mentioned added variables (sex, age, primary school/special needs school teachers, work experience assessed in years and school type they were educated to teach at).

3.2.1 Effective classroom management strategies

Our fit indices reveal a good model fit for the model regarding the intention to apply effective CMS with the additional variables (test of model fit: $\chi^2(2) = 1.13$, $p = .57$; test for the baseline model: $\chi^2(39) = 458.81$, $p < .01$; $CFI = 1.00$; $TLI = 1.00$; $RMSEA = 0.00$; $SRMR$ = 0.01) and a high variance explanation ($R^2_{intention}$ = .47, $p < .01$; $R^2_{behav.\ attitude}$ = .24, $p < .01$). The model is depicted in figure 1. For the intention to implement effective CMS overall 47% (R^2 = .47) of the variance were explained, equaling high clarification as well [45]. Variables positively contributing were behavioral attitude towards effective CMS (β = .42, $p <$ .01), perceived behavioral control (β = .18, $p < .01$), conscientiousness (β = .11, $p < .01$), in-

dividual stress through ADHD (β = .14, p < .01), teachers affiliated with a primary or special needs school (β = .19, p < .01). Stress reactivity (β = -.15, p < .01) revealed a negative impact. The variance clarification regarding the behavioral attitude towards effective CMS was at 24% (R^2 = .24). Variables with a positive influence were knowledge (β = .21, p < .01), sex (β = .13, p < .01), perceived behavioral control (β = .21, p < .01), extraversion (β = .12, p < .01), attitude towards students with ADHD (β = .14, p < .01), and teachers affiliated with a primary or special needs school (β = .09, p < .05). All mediations with the intention to apply effective CMS as the dependent and the behavioral attitude towards CMS as the mediating variable are significant: knowledge (β = .09 [95%-CI: 0.06, 0.13]), sex (β = .06 [95%-CI: 0.2, 0.1]), perceived behavioral control (β = .09 [95%-CI: 0.05, 0.14]), extraversion (β = .05 [95%-CI: 0.01, 0.09]), attitude towards students with ADHD (β = .06 [95%-CI: 0.02, 0.11]), and teachers affiliated with a primary or special needs school (β = .04 [95%-CI: 0.003, 0.09]).

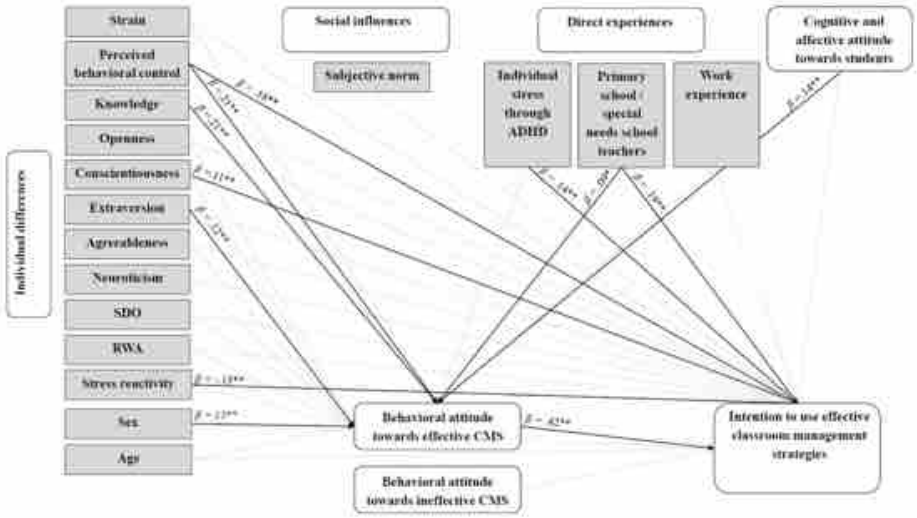

Figure 1. Path model showing the variables that influence the application effective CMS. Arrows represent significant relevant variables (* < .05, ** < .01). Path models' fit Indices: $R^2_{\text{intention to use effective CMS}}$ = .47**; $R^2_{\text{behav. attitude}}$ = .24**, test of model fit: $\chi^2(2)$ = 1.13, p = .57; test for the baseline model: $\chi^2(1)$ = 458.81, p = <.01.; *CFI* = 1.00; *TLI* = 1.00; *RMSEA* = 0.00; *SRMR* = 0.01.

3.2.2 Ineffective classroom management strategies

Even if the direct replication of the model to explain the intended implementation of ineffective CMS was satisfactory, we calculated another model. Our aim was to find out whether additional variables would clarify a further intention's variance. In figure 2, path, our analysis focusing on the intention to apply ineffective CMS is shown. Fit indices suggest a good model fit for the model regarding the intention to apply ineffective CMS with the added variables (test of model fit: $\chi^2(7)$ = 2.16, p = .95; test for the baseline model: $\chi^2(39)$ = 300.89, p < .01; *CFI* = 1.00; *TLI* = 1.00; *RMSEA* = 0.00; *SRMR* = 0.01) and a high variance explanation ($R^2_{\text{intention}}$ = .39, p < .01; $R^2_{\text{behav. attitude}}$ = .10, p < .01).

Variance clarification regarding the intention to apply ineffective CMS is at 39%. Variables that contributed positively to variance explanation were behavioral attitude towards ineffective interventions (β = .43, p < .01), subjective norm (β = .08, p < .05), individual stress through ADHD (β = .11, p < .01), and RWA (β = .14, p < .01). Variables having a negative impact were perceived behavioral control (β = -.14, p < .01) and attitude towards students with ADHD (β = -.12, p < .01).

The amount of variance explained in the behavioral attitude towards ineffective interventions was 10% (R^2 = .10), implying low-to-moderate variance clarification [45]. Positively contributing variables were RWA (β = .14, p < .01), and strain (β = .12, p < .05). Knowledge was a negatively contributing variable (β = -.15, p < .01).

All mediations with the intention to apply CMS as the dependent variable, and the behavioural attitude towards ineffective CMS were significant: RWA (β = .06 [95%-CI: 0.02, 0.11]), strain (β = .05 [95%-CI: 0.01, 0.1]), knowledge (β = -.07 [95%-CI: -0.11, -0.2]). Table 3 shows all inter-correlations between variables.

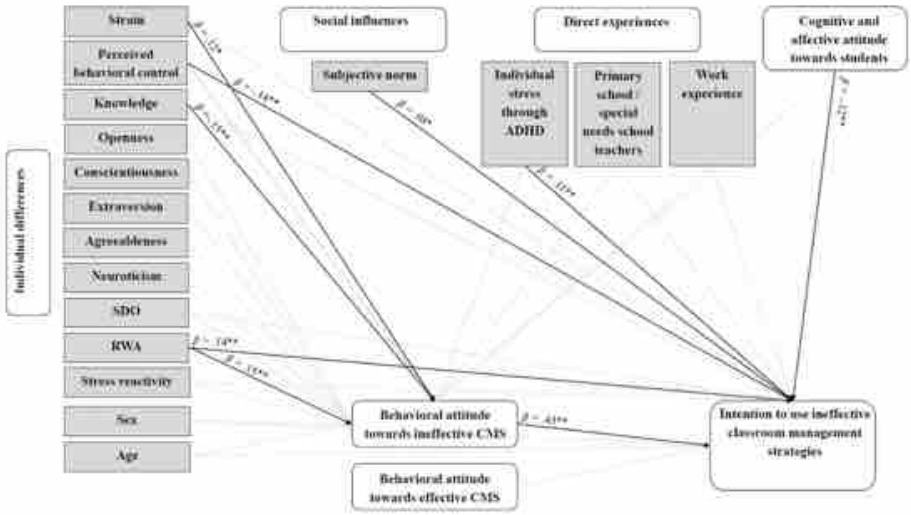

Figure 2. Path model showing the variables that influence implementation of ineffective CMS. Arrows represent significant relevant variables (* < .05, ** < .01). Path models' fit Indices: $R^2_{\text{intention to use ineffective CMS}}$ = .39**; $R^2_{\text{behav. attitude}}$ = .10**; test of model fit: $\chi^2(7)$ = 2.16, p = .95; test for the baseline model: $\chi^2(39)$ = 300.89, p = <.01.; *CFI* = 1.00; *TLI* = 1.00; *RMSEA* = 0.00; *SRMR* = 0.01.

In table 2, all inter-correlations between the variables are listed.

Table 2. Inter-correlation between the investigated variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Knowledge	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Age	.23**	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Work experience	.20**	**.87****	1	-	-	-	-	-	-	-	-	-	-	-	-	-
ADHD experience	.03	**.31****	**.32****	1	-	-	-	-	-	-	-	-	-	-	-	-
Sex	.15**	-.01	.05	-.09*	1	-	-	-	-	-	-	-	-	-	-	-
Primary/special needs school teachers	.14**	.14**	.17**	-.14**	.21**	1	-	-	-	-	-	-	-	-	-	-
Attitude towards effective CMS	.29**	.14**	.15**	.02	.20**	.19**	1	-	-	-	-	-	-	-	-	-
Attitude towards ineffective CMS	-.17**	-.10*	-.04	.01	-.04	-.05	-.09*	1	-	-	-	-	-	-	-	-
Attitude towards students	-.12**	-.07	-.10*	.01	-.07	-.04	.17**	-.02	1	-	-	-	-	-	-	-
). Perceived control	.10*	.12**	.17**	.13**	.00	.13**	**.33****	.01	**.32****	1	-	-	-	-	-	-
I. Subjective norm (shortened)	-.04	-.08	-.09*	-.07	.01	.07	-.03	-.03	-.07	-.16**	1	-	-	-	-	-
2. PSRS	-.04	-.10*	-.10*	-.14**	.21**	.08	-.11*	.05	-.20**	-.23**	**.35****	1	-	-	-	-
). Strain (BSI)	-.09*	-.07	-.07	.04	-.06	.03	-.10*	.14**	-.04	-.11**	.01	**.31****	1	-	-	-
I. Stress (self - report)	.07	.06	.06	.00	.15**	.20**	-.08	.02	**-.37****	**-.31****	.19**	.26**	.09*	1	-	-
5. Application of effective CMS	.26**	.20**	.24**	.06	.24**	**.35****	**.55****	.03	.01	**.32****	-.05	-.11**	-.09*	.13**	1	-
5. Application of ineffective CMS	-.13**	-.15**	-.11**	-.04	.02	-.03	-.21**	**.46****	-.24**	-.27**	.17**	.22**	.11*	.24**	-.08	1
)O	-.18**	-.11**	-.05	-.01	-.10*	-.05	-.14**	.16**	-.13**	-.08*	-.07	-.02	.02	.06	-.04	.15**
WA	-.13**	-.07	-.05	-.03	.02	.05	-.09*	.18**	-.16**	.12**	.07	.13**	.04	.18**	.04	.24**
.	.07	.09*	.05	.07	.03	-.01	.09*	.03	.05	.19**	-.04	-.07	.00	.00	.14**	-.07
.	.14*	.08	.08*	.06	.17*	.04	.15**	-.03	-.04	.12**	-.04	-.09*	-.17**	.00	.24**	-.09*
.	.07	.01	.01	.03	.05	-.02	.17**	.04	.04	.16**	-.12**	-.24**	-.07	-.04	.15**	-.09*
.	.13**	.18**	.15**	-.02	.09*	.05	.20**	-.09*	.08	.16**	.03	-.10*	-.10*	-.02	.14**	-.16**
.	-.09*	-.12**	-.12**	-.13**	.13*	.06	-.15**	.05	-.18**	-.26**	.22**	**.64****	**.38****	.24**	-.11**	.20**

Notes: **<.01; *<.05*; O = Openness; C = Conscientiousness; E = Extraversion, A = Agreeableness, N = Neuroticism

4. Discussion

In the present study we aimed to examine whether the facilitators and barriers regarding the implementation of CMS supporting students with ADHD that are important for pre-service teachers are replicable among in-service teachers. We additionally analyzed whether extending our model with further variables of potential relevance when examining in-service teachers would enhance the clarification of variance.

4.1 First research question ("Can the model to apply (in-)effective CMS for pre-service teachers be replicated in a sample of in-service teachers?")

The model that worked best to explain variance in the intention to apply ineffective CMS for pre-service teachers results in a good fit for in-service teachers (36% clarified variance in the intention to use ineffective CMS). Primarily, the behavioral attitude towards ineffective CMS contributed significantly to variance explanation, whereas the model aiming to explain the intention to apply effective CMS was not satisfactory.

The major disadvantage of this direct replication is that variables describing differences between in-service teachers like work experience were not included as they could not be assessed with our sample of pre-service teachers as they were so homogeneous. Most likely, this factor clarifies why our model explaining the intention to apply effective CMS revealed an unsatisfactory model fit. Therefore, our next research question aimed to determine whether extending our model with variables that do justice to that fact would improve the intentions variance clarification.

4.2 Second research question ("Does expanding the model for in-service teachers result in an improved model fit?")

Relying on the aforementioned results, we conducted two further path analyses that included more predictors. Due to differences between pre- and in-service teachers, we investigated whether variables that do justice to those (sex, age, work experience assessed by years on the job and type of school) would enable us to deepen our knowledge about the intention to apply (in-) effective CMS. It follows that replicating with those variables led in both cases to a better model fit, implying that the added variables are important for variance clarification, especially regarding effective CMS. The extended model clarifies 47% of the intention to apply effective CMS and 39% in the intention to apply ineffective CMS. The following sections refer to all variables included in the extended models.

4.3 Extended model regarding effective CMS

In comparison to the model that fits best for pre-service teachers, the added variables make a strong explanatory contribution. Furthermore, every variable influencing the behavioral attitude towards effective CMS also influences the intention to apply effective CMS mediated through behavioral attitude.

4.3.1 Attitude towards effective CMS and students with ADHD

The behavioral attitude towards effective CMS is the most important variable regarding variance clarification towards the intention to apply effective CMS. This is consistent with the finding in pre-service teachers [20] and an Austrian study including pre-service and in-service teachers [22]. In concordance with Ajzen [21], behavioral attitude reveals a stronger impact than the attitude towards students with ADHD. The latter is important for the variance clarification towards the behavioral attitude. But it does not clarify variance in the intention to apply effective CMS, which is in line with the findings in pre-service teachers and the Austrian sample [20,22]. However, it supports the assumption that a more positive attitude towards students with ADHD strengthens the intention to apply effective CMS indirectly mediated through the behavioral attitude, which is in line with the TPB [21].

Dort et al. [47] identified three different latent classes of teachers regarding their attitude towards students with ADHD. The attitude-profile class assumed to be the most

helpful for students with ADHD is, surprisingly, not associated with the best attitude score. Having a realistic attitude that differentiates the positive aspects of students as positive and those negative as negative is more often associated with implementing effective CMS, although the most positive attitude on average was not associated with any particular application of effective or ineffective CMS. This fact may explain why a pooled measurement of attitude towards students with ADHD makes an only conditional contribution.

4.3.2 Direct experiences

Individual stress through ADHD revealed a positive contribution towards the intention to apply effective CMS. Individual stress is not relevant to pre-service teachers in conjunction with their intention to apply effective CMS [20]. Nevertheless, a certain amount of stress triggered by children with ADHD seems to be beneficial for in-service teacher sin helping them deal positively with the classroom challenges that children with ADHD induce. This is in line with research on stress demonstrating that performance under pressure initially increases [48].

The teachers' affiliation with primary or special needs schools showed likewise a positive contribution towards the intention to apply effective CMS. Primary and special needs school teachers might undergo different training than teachers from other types of school. This training might focus more on managing strenuous classroom behavior. Furthermore, there might be a difference between teachers who choose to be special needs or primary school teachers compared to others. These two aspects might explain why teachers' affiliation with primary or special needs school reveals a positive association with the behavioral attitude towards effective CMS and with the intention to apply effective CMS. Thus the training that teachers at other school types undergo might benefit from absorbing aspects from the training offered to student teachers planning to work in a special needs or primary school. Work experience measured by years on the job showed no relevant contribution.

4.3.3 Social influences

Subjective norm revealed no relevant impact on the intention to apply CMS or the behavioral attitude towards effective CMS, a finding in line with the evidence from pre-service teachers, the Austrian study sample, and other investigations in the school context [20,22,26].

4.3.4 Individual differences

Conscientiousness and extraversion are two personality variables demonstrating positive effects. They might therefore be beneficial for creating a positive attitudes towards CMS and their implementation [49]. In contrast to the models with pre-service teachers and unlike in the Austrian study sample, we found that psychological strain made no relevant contribution to the intention or attitude towards effective CMS among in-service teachers [20,22]. However, stress reactivity, which characterizes the troublesome handling of stressful situations [33], revealed a negative impact on the intention to apply effective CMS, highlighting that if teachers are better at handling stressful situations, they may also be more likely to apply or feel more strongly the intention to implement effective CMS.

Knowledge makes a positive contribution towards the behavioral attitude and therefore supports the assumption that basic knowledge is important, but not sufficient to enhance the intention to apply effective CMS [20,50]. Perceived behavioral control is relevant both for the behavioral attitude towards effective CMS and for the intention to apply effective CMS; however, we did not observe this effect among pre-service teachers [20]. The expectation that one is capable of applying effective CMS is one of the most important variables in the present study. This reinforces findings regarding perceived behavioral control: In the context of implementing supportive strategies for students in an inclusive context, perceived behavioral control is similarly relevant [26].

Furthermore, there is a sex difference in CMS implementation: Female sex contributes positively to the behavioral attitude towards effective CMS, in line with the (rare)

research on sex differences in teaching. For example, a study by Sternglanz and Lyberger-Ficek [35] showed that male teachers prefer teaching male students, whereas no difference was observed in female-headed classrooms. This finding concurs with the present study's, namely that in contrast to their male colleagues, women do not seem to favor any special group of students. However, the aforementioned study is quite dated, and sex differences in teaching have received little attention since then.

4.4 Extended model regarding ineffective CMS

Behavioral attitude as well as the attitude towards students with ADHD, individual differences, direct experiences, and social influences all contribute to explaining variance. Furthermore, every variable that makes a contribution towards the behavioral attitude towards ineffective CMS also has an influence on the intention to apply ineffective CMS, mediated through behavioral attitude.

4.4.1 Attitude towards ineffective CMS and towards students with ADHD

Behavioral attitude towards ineffective CMS is the most important variable regarding variance clarification in the intention to apply ineffective CMS, supporting the Austrian study's conclusion and the study with pre-service teachers that assumed that the strategy applied with the desired effect is the most important variable [20,22]. Attitude towards students with ADHD makes a negative contribution towards the intention to apply ineffective CMS, which differs from the pre-service teachers' finding [20], but is in line with the Austrian study results [22]. This finding implies that a more positive attitude towards students with ADHD might weaken the intention to apply ineffective CMS.

4.4.2 Direct experiences

Individual stress through ADHD makes a positive contribution towards the intention to apply ineffective CMS. This is interesting, as it also makes a positive contribution towards the intention to apply effective CMS. It might be that participants who feel more stressed by students with ADHD feel a stronger intention to apply any kind of CMS, whether they are effective or not. This explanation might be supported by teachers' lack of knowledge especially when it comes to ADHD treatment [51]. It so happens that teachers want to react to stressful students, but together with their little knowledge they then strongly intend to apply any kind of CMS.

This finding is of particular importance, as Westman and Etzion [52] showed that there is a crossover effect regarding school stress between teachers and their principals, implying that every stressed teacher contributes to creating a tense mood in the school, reinforcing a generally bad mood and vicious circle. The variables work experience assessed by years on the job and the affiliation with primary and special needs schools did not contribute significantly to variance clarification.

4.2.3 Social influences

The subjective norm contributes to the intention to apply ineffective CMS. This finding differs from those from pre-service teachers and the Austrian study [20,22] and implies that a higher rating on subjective norm might trigger a stronger intention to apply ineffective CMS. This in turn might indicate that implementing ineffective CMS is a more socially recognize behavior and therefore this kind of CMS is applied more consistently by in-service teachers [16]. Another potential explanation is that teachers want to do something, but are unable to differentiate between effective and ineffective CMS. Other research focusing on (changing) teacher behavior has also suggested that subjective norm is relevant and that implementing different strategies in the classroom depends primarily on other teachers, headmasters, and parents [53,54]. To convince teachers to avoid implementing ineffective CMS, a general rethink must take place.

4.2.4 Individual differences

RWA exhibited a positive relationship with the behavioral attitude towards and intention to apply ineffective CMS - which makes sense, as it represents submission to authority, strict adherence to conventional standards, and general authority-sanctioned

aggressivity toward others [55]. This suggests that teachers stick to applying ineffective CMS, as those are more traditional and emphasize the hierarchy between students and teachers. According to Lottie [56], more conservative, authoritarian teachers are more resistant to change because they are pursuing a system-immanent career and have developed their beliefs about teaching and learning mainly from their own, mostly positive experiences when they were in school [57]. Ineffective CMS often have positive short-term effects, e.g. getting the student to leave the classroom without comment leads immediately to less interference. But these strategies do not reduce strenuous, annoying behavior over the long term, as they tend to reinforce it because the misbehaving student has no chance to learn alternative behavior (even though teachers may have had short-term positive experiences with them).

Psychological strain exhibited a positive relationship with the behavioral attitude towards ineffective CMS, thus supporting the assumption that greater strain in teachers leads to less engagement and therefore more frequent application of ineffective CMS in the classroom and a worse teacher-student relationship [58,59].

Knowledge revealed a negative impact on the variance clarification of the behavioral attitude, but not on the intention to apply ineffective CMS. Ajzen and colleagues [50] claimed that knowledge is necessary, but not enough for the intention to do something directly - in line with our finding. Nevertheless, there is a knowledge gap in teachers regarding the handling of ADHD in the classroom, and it helps to differentiate between effective and ineffective CMS. We need to close this knowledge gap [51].

Perceived behavioral control demonstrated a negative relationship with the intention to apply ineffective CMS - exactly the same finding as in our sample of pre-service teachers and in the Austrian study [20,22].

4.3 Implications

The behavioral attitude, and therefore expectation that a specific CMS will prove effective is the most important variable regarding the intention to apply a specific CMS in pre- and in-service teachers. The attitude towards students with ADHD proved to be important indirectly [20,22]. Those findings highlight the need for experimental testing to change attitudes about and therefore expectations towards CMS and towards students with ADHD.

A preliminary investigation by Barnett, Corkum and Elik [60] showed that a web-based intervention changed teachers' attitudes and self-reported competence in teaching, an indication of what might be beneficial. We are planning a virtual reality investigation to examine how attitude-related expectations can be changed. The expectations about CMS and therefore attitude towards those CMS are relevant, and research should thus focus on changing those expectations. An experiment could be set up in which the reaction of the students to certain CMS differs from their teachers' expectations. One could then examine if and how teachers' expectations change.

Direct experiences, such as individual stress through ADHD are important in clarifying variance in the intention to apply effective and ineffective CMS and in the behavioral attitude towards effective CMS. Low-intesity stress from children with ADHD seem to be beneficial in conjunction with the intention to implement effective CMS, while more severe stress increases the likelihood to apply ineffective CMS. The handling of students perceived to be hard to manage and strenuous is therefore an important topic to address more intensively; it would be an interesting approach to investigate whether the stronger implementation of effective CMS reduces such stress and if that in turn leads stronger intention to apply effective CMS.

Another important direct experience in clarifying variance in the intention to apply effective and ineffective CMS and in the behavioral attitude towards effective CMS is teachers' affiliation with primary and special needs school (but not work experience as years doing the job). Teachers at primary and special needs schools have a more positive attitude towards effective CMS and show a stronger intention to implement them. On the one hand, this can be because there is a self-selecting process in advance, i.e. which

type of school was chosen, but on the other hand, those teachers might undergo different training, e.g. regarding ADHD. Their education concerning ADHD could set a good example for the training of teachers at other types of school.

Social influences like the subjective norm show a positive relationship with the intention to apply ineffective CMS, suggesting that teachers are assuming that ineffective CMS are appropriate. For attempts to change attitudes and for the intention to apply CMS to succeed, this fact needs to be considered. Overall, effective CMS must become well established and popular among teachers.

Individual differences, like conscientiousness, extraversion, RWA, strain, stress reactivity, knowledge, perceived behavioral control, and sex show a diverging amount of variance clarification. Conscientiousness, extraversion, and RWA are three person-inherent variables that make it easier or harder for teachers to integrate effective CMS and reject ineffective ones. Psychological strain is positively associated with ineffective CMS, and stress reactivity negatively with effective CMS. A Germany-wide investigation showed that primary teachers suffer from work-related psychosocial exhaustion and that the reasons for this are physical problems and an effort-reward imbalance [61,62]. This suggests that handling stress and improving mental health are key influencing factors to target. One approach would be to integrate a relaxation program [63], which could be the first step in reducing the pressure on teachers. We need to examine whether that would in turn lead to the better implementation of CMS. Both knowledge and perceived behavioral control exert a preventive effect, as they reinforce directly and indirectly the intention to apply effective CMS and dampen the intention to apply ineffective CMS. For example, it would be worthwhile to develop further the aforementioned web-based intervention by Barnett and colleagues [60] in this regard.

The present study is based on an online questionnaire, thus our results depend on the participants' own-assessments and could thus be biased. Furthermore, we were unable to investigate whether group of teachers who dropped out differed from those who completed the survey. Moreover, we can make no statements about causal influences as our results, which are of correlative nature due to the cross-sectional design.

As mentioned in our first investigation [20], the literature reveals an intention-behavior gap [64] indicating that intention and behavior are not closely related, and a medium to enable major change in the intention only leads to a small-to-medium change in the belonging behavior [64]. Therefore, we can only make assumptions but no clear predictions about teachers' implementaion of CMS. Furthermore, in line with Ajzen [21,50,65], retrospective contemplation of own's own behavior is often biased, and contrary to the intention, a poor predictor of subsequent behavior. In summary, it would be preferable to assess the behavior of interest specifically, which would necessitate an experimental investigation or natural setting.

5. Conclusions

Behavioral attitude and therefore the expectation that a specific CMS is (in)effective is the most important variable regarding variance clarification in the intention to apply CMS in pre- and in-service teachers in Germany and Austria. The attitude towards students with ADHD, as well as personal experiences, social influences, and individual differences are important as well. Generally speaking, ADHD-specific knowledge and perceived behavioral control might be easy to influence and demonstrate the desired effect of eventually enhancing the intention to apply effective CMS. Further, experimental investigations and training interventions for pre- service and in-service teachers are needed to finally close this gap between the scientific evidence and actual practice.

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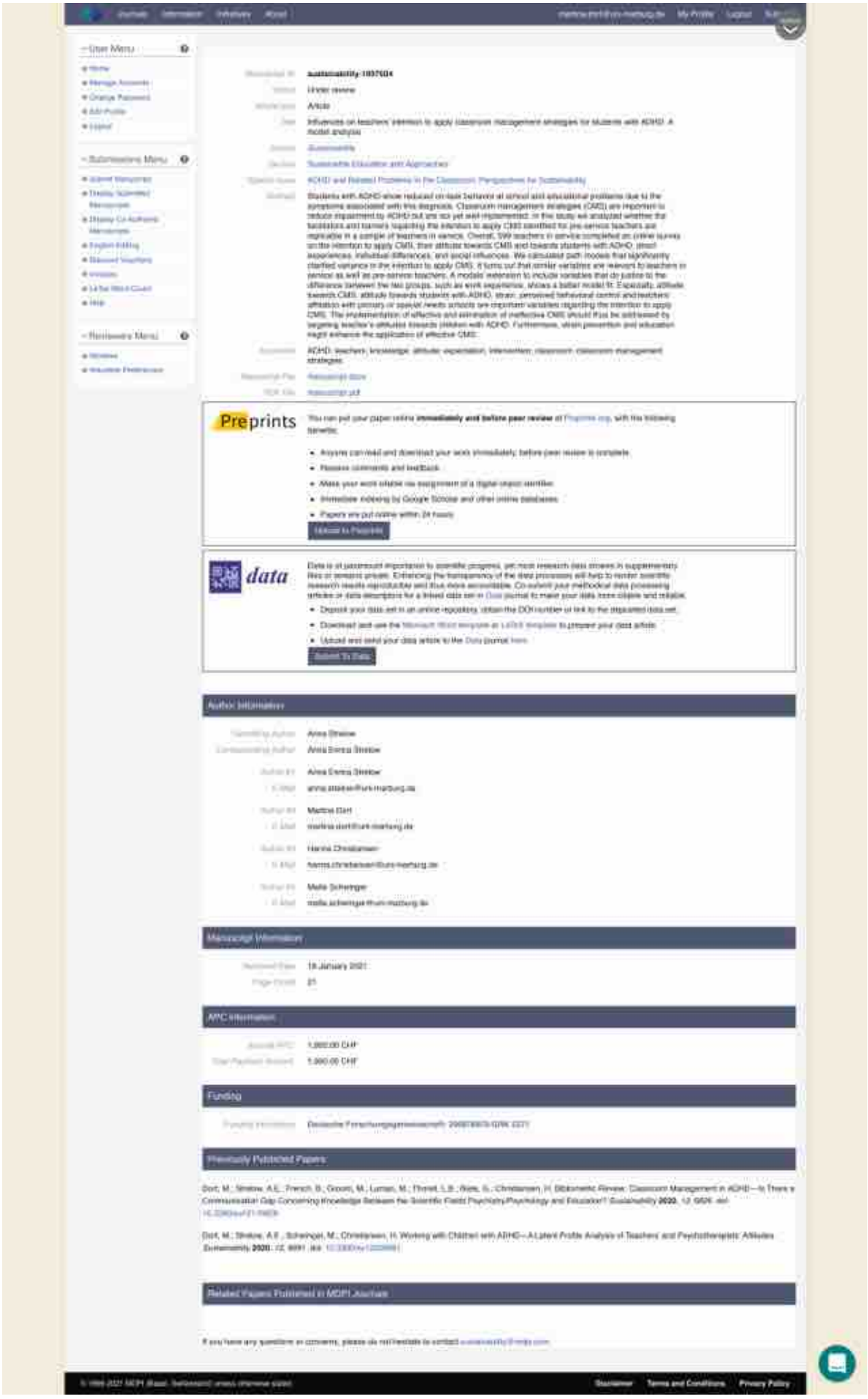

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PERSÖNLICHE ANGABEN

Name: Martina Sarah Dort geb. Thiring

PUBLIKATIONSLISTE

Dort, M., Strelow, A. E., French, B., Groom, M., Luman, M., Thorell, L. B., . . . Christiansen, H. (2020). Bibliometric Review: Classroom Management in ADHD—Is There a Communication Gap Concerning Knowledge Between the Scientific Fields Psychiatry/Psychology and Education? *Sustainability*, *12*(17), 6826. https://doi.org/10.3390/su12176826

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Strelow, A. E., Dort, M., Schwinger, M., & Christiansen, H. (2020). Influences on pre-service teachers' intention to use classroom management strategies for students with ADHD: A model analysis. *International Journal of Educational Research*, *103*, 101627. https://doi.org/10.1016/j.ijer.2020.101627

Strelow, A. E., Dort, M., Schwinger, M., & Christiansen, H. (under review). Influences on in-service teachers' intention to use classroom management strategies for students with ADHD: A model replication analysis. *Sustainability*.

Zemp, M., Hehlke, L., Strelow, A. E., Dort, M., & Christiansen, H. (under review). Was beeinflusst die Intention von Lehrpersonen, (in)effektive Interventionen bei Schüler*innen mit ADHS einzusetzen? Eine Replikationsstudie mit einer österreichischen Stichprobe. *Psychologie in Erziehung und Unterricht*.

Eidesstattliche Erklärung

Ich versichere, dass ich meine Dissertation

ADHS im Klassenzimmer: Die Einstellung von Lehrkräften zu Schülerinnen und Schülern mit einer Aufmerksamkeitsdefizit-/Hyperaktivitätsstörung sowie zu entsprechenden Classroom-Management-Strategien

selbstständig, ohne unerlaubte Hilfe angefertigt und mich dabei keiner anderen als der von mir ausdrücklich bezeichneten Quellen und Hilfen bedient habe.

Die Dissertation wurde in der jetzigen oder einer ähnlichen Form noch bei keiner anderen Hochschule eingereicht und hat noch keinen sonstigen Prüfungszwecken gedient. Ich bin mir bewusst, dass es sich bei Plagiarismus um schweres akademisches Fehlverhalten handelt, das sanktioniert werden kann.

Marburg, _____ _____

Datum Martina Sarah Dort

Erklärung über die Prozentverteilung

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Martina Sarah Dort

Prof. Dr. Hanna Christiansen